A McGRAW-HILL PUBLICATION

Chemical Week

November 21, 1959

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How steel-plant reopenings brighten CPI's supply, expansion, profit outlook . p. 26

The 18 process industries—size, products, location, and where they'll expand . p. 38

Spurt in research on disperse dyes. . p. 155

Cold-formed polystyrene vies for a foothold in packaging industry . . . . . p. 195

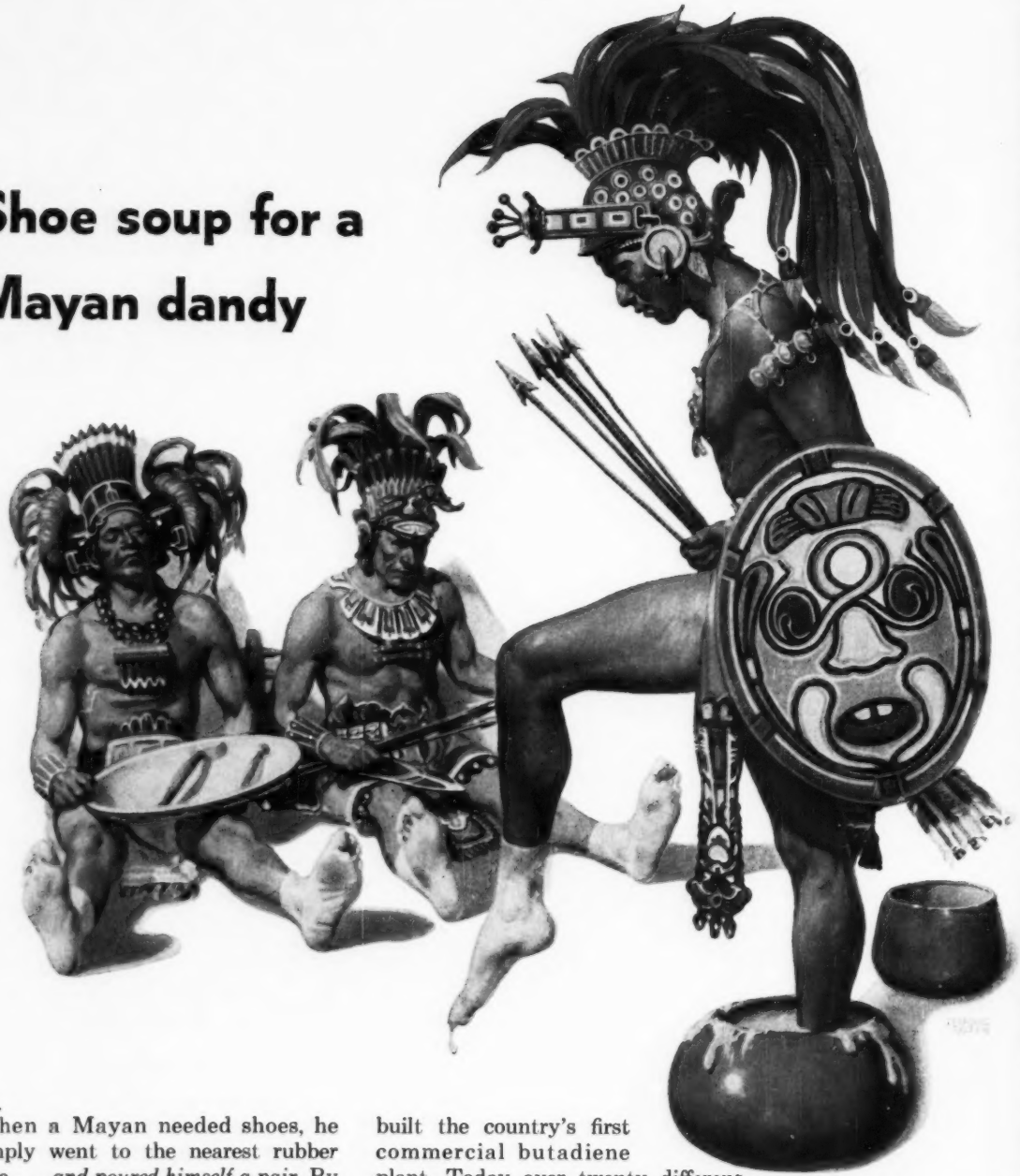
FINAL

CHEMSHO

CO

STEVENS RICE
UNIVERSITY MICROFILMS IN
313 N 1ST ST
ANN ARBOR MICH

Shoe soup for a Mayan dandy



The Mayan and other Indians of Latin America discovered a unique material for making clothing and footwear.

When a Mayan needed shoes, he simply went to the nearest rubber tree . . . *and poured himself a pair.* By dipping his feet repeatedly into a bath of raw latex, he fashioned a kind of shoe. The style was crude, but the fit was perfect.

Rubber goods have come a long way since then, and the development of *synthetic* rubber has been an important factor in this growth—especially since 1941 when Shell Chemical built the country's first commercial butadiene plant. Today over twenty different types of Shell synthetic rubber go into such varied products as shoe soles and heels, tires, belting, floor tile, wire and cable insulation, and hundreds more.

Commercial production of this strong and versatile material is another of the many ways Shell Chemical helps industry with man-made raw materials.

Shell Chemical Corporation

Chemical Partner of Industry and Agriculture

TORRANCE, CALIFORNIA

SHELL

BORDEN CHEMICAL DEVELOPS A NEW VINYL TUBING FOR AIRCRAFT

It's Resinite EP-93C—electrical insulation sleeving. The big news about it? It's *the* tubing that's *both crystal clear and anti-fungus at the same time!* Borden Chemical's Development Laboratory at North Andover, Mass. developed it. But the point is that North Andover is just one example. All told, coast to coast, Borden Chemical has *seven* such labs with the capabilities to solve an infinite variety of resin and polymer problems. *Including yours!* Write The Borden Chemical Company, 350 Madison Ave., N. Y. 17, N. Y.

IF IT'S A
BORDEN CHEMICAL
IT'S GOT TO BE GOOD

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...the most effective (and economical) form of Vitamin B_{12} for dry multivitamin preparations

Clinical studies have proved that absorption of vitamin B_{12} by the human body is 100% higher with Pfizer STABLETS than with the regular form of the vitamin. In STABLETS the vitamin B_{12} is *adsorbed* on a pharmaceutical grade ion-exchange resin.

In addition to the all-important availability, Pfizer STABLETS possess outstanding stability—reducing potency losses by more than 50%. You'll save money on lower overage requirements, while assuring long shelf life at full label strength for your multivitamin preparations.

STABLETS are available in two types. *STABLETS Type I*—1% crystalline vitamin B_{12} U.S.P. adsorbed on resin. *STABLETS Type II*—1% cobalamin concentrate N.F. adsorbed on resin.

It's worth your while to investigate the benefit for your customers and the savings you'll realize by using stable, easy-to-handle Pfizer STABLETS.

Pioneer in the Manufacture of Vitamins

Pfizer

Science for the world's well-being

Chas. Pfizer & Co., Inc., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.

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Chemical Week

TOP OF THE WEEK

NOVEMBER 21, 1959

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When you consider expansion... the most important investment you can make is in the creative ability of men.

FLUOR

Engineers and Constructors

Design in three dimensions

At Fluor's Los Angeles headquarters, there is an 8,000-square-foot building where 30 plant designers work with 20 professional modelmakers. Drafting tables are within 10 feet of model assembly tables. Another building contains an elaborate photographic studio where precisely scaled isometric and plan views can be taken under shadowless lighting.

All this began seven years ago when Fluor engineers built a scale model and rigged miniature hoists to solve a difficult erection problem. Success of this trial led to experiments with the use of models as a basic design tool. Cost studies showed substantial savings in drafting man-hours (net savings, above modelmaking costs.)

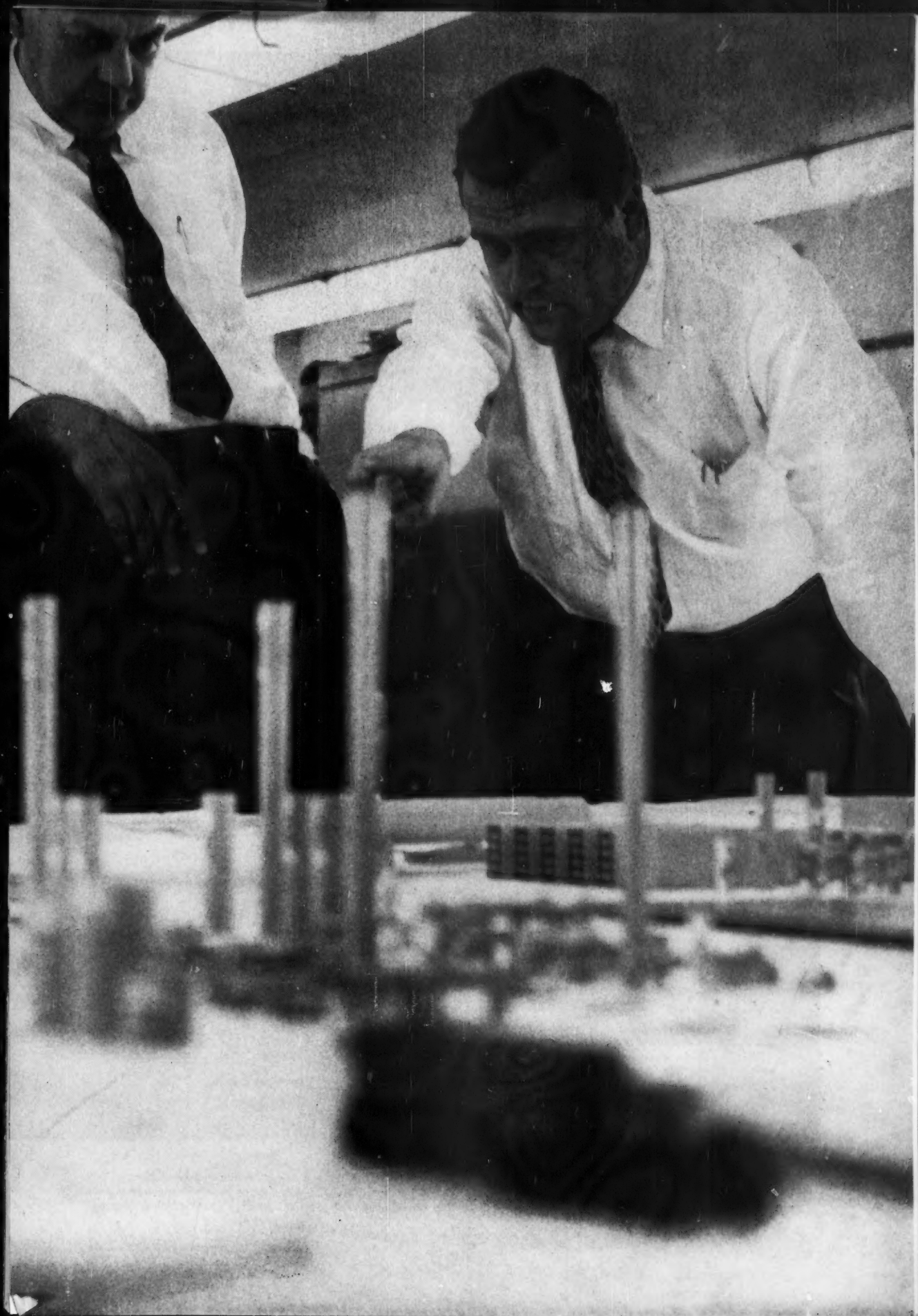
Today, models are to be found in most of Fluor's drafting rooms, and nearly all Fluor-built plants are designed with the aid of this tool. Beyond the dollar savings there are many less tangible benefits. Sizable groups can confer over a model, reach quick agreement on layouts, approve or revise many details at a single session.

Piping runs are shorter and more direct, valves and instruments are more accessible when designers lay them out on a model (a Fluor comparison study of a refinery design showed a $50,000 saving in pipe, fittings and fabrication by use of a model vs. conventional layout drawings.)

Costly revisions are minimized when many specialists can study a complete plant in miniature before construction begins. In the field, models serve as a reference for construction crews and a guide for operator training.

Unless scale models are properly used—as a basic, integrated design tool—most of these advantages are lost. The development and refinement by Fluor of design techniques using scale models has been a creative contribution to the engineering and construction industry.

For more information on the use of scale models in design and construction, write to Dept. 80, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.



Characteristics of various types of cellophane at sub-zero temperatures are studied as a part of a broad scale research program carried out by Olin Mathieson's Packaging Division.

BLOCKSON

Trisodium Phosphate • Trisodium Phosphate Chlorinated • Sodium Tripolyphosphate • Tetrasodium Pyrophosphate
Sodium Hexametaphosphate • Monosodium Phosphate • Disodium Phosphate • Sodium Acid Pyrophosphate • Tetrapotassium
Pyrophosphate • Sulfuric Acid • Hydrofluoric Acid • Sodium Silicofluoride • Sodium Fluoride • Teox® 120 Surfactant

The cold logic of better chemical service

It's logical for a good chemical supplier to anticipate his customers' needs. At Olin Mathieson, the Chemicals Division has just committed $30,000,000 to make sure its customers continue to get the kind of service they need. Here's what's in the works.

Construction of new facilities has begun at the Brandenburg, Ky. plant for the production of glycerin, epichlorohydrin, propylene oxide, propylene glycol and polypropylene glycols; as well as expansion to double production of glycol ethers, surfactants, and ethylene dichloride. Construction of a new plant is under way to produce sulfamic acid at Joliet, Ill. A new electrolytic cell program to increase chlorine tonnage is going forward at Niagara Falls, N. Y.

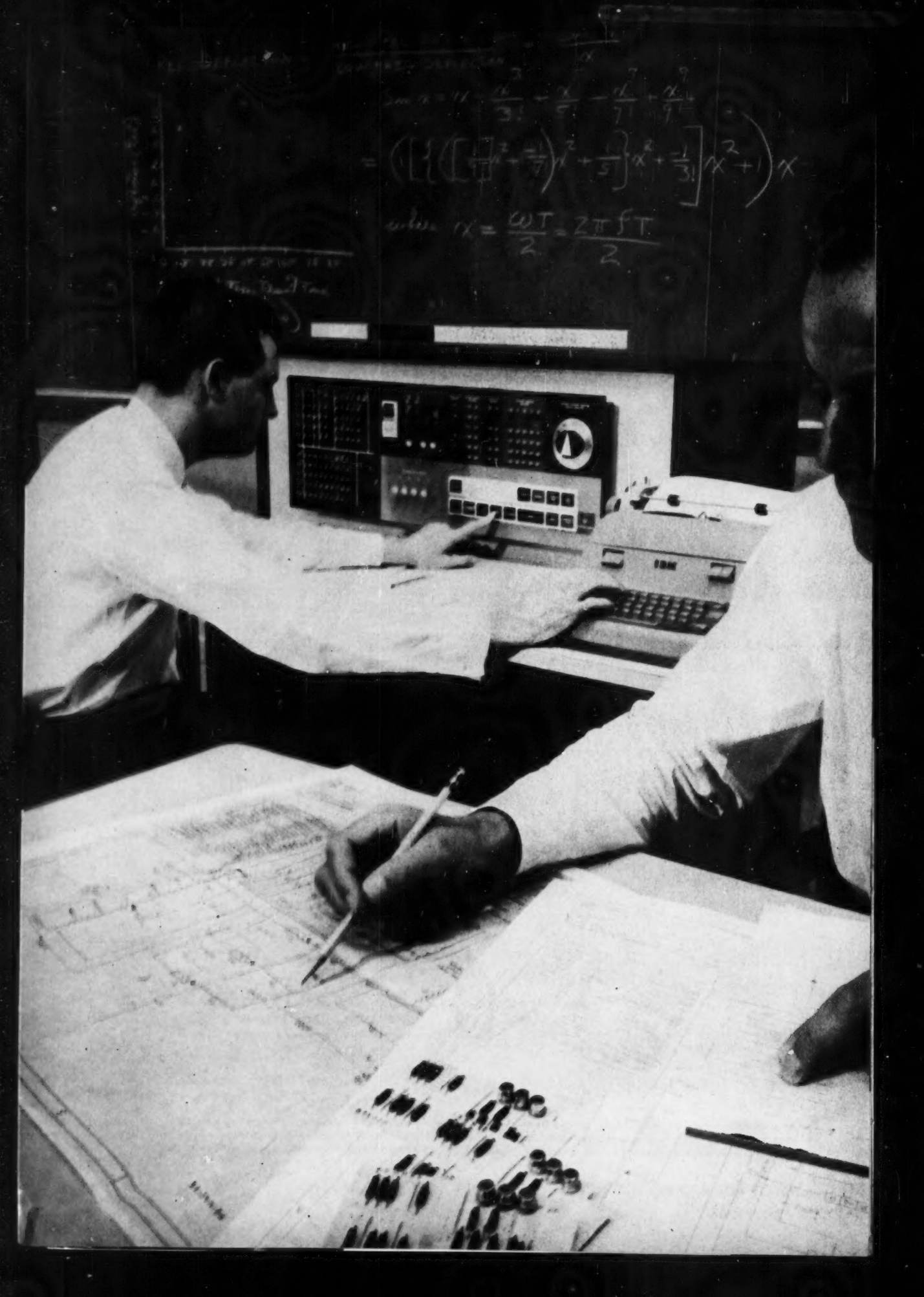
To you as a buyer, this is additional assurance that the chemicals you order from Olin Mathieson will always be available when, where, and how you want them. Your Olin Mathieson representative will be glad to explain the logic of Olin Mathieson chemical service and prove it to be a wise, economical choice.

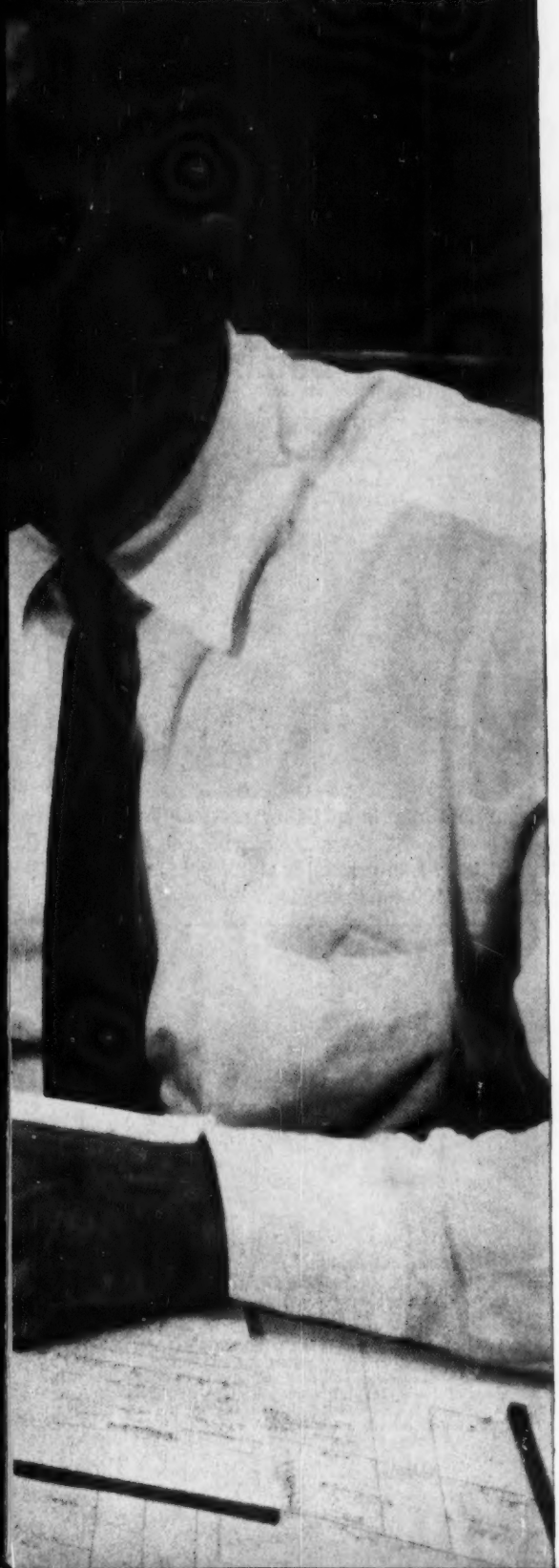
OLIN MATHIESON
CHEMICAL CORPORATION
Chemicals Division • Baltimore 3, Md.

7201

MATHIESON

Ammonia • Bicarbonate of Soda • Carbon Dioxide • Caustic Soda • Chlorine • Formaldehyde • Hydrazine and Derivatives • Hypochlorite Products
Methanol • Muriatic Acid • Nitrate of Soda • Nitric Acid • Soda Ash • Sodium Chlorite Products • Sodium Methylate • Sulfur (Processed)
Sulfuric Acid • Urea • Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Ethanolamines • Glycol Ethers • Surfactants • Ethylene Dichloride





announcing the new

IBM® 1620

first solid state engineering computer in the low-price field

Here is a new and powerful stored program, desk-size computer designed to bring more computing ability to engineering problems at low cost.

Transistorized throughout, the IBM 1620 is the only solid state, core-storage computer in its price class.

Easy to learn—easy to operate—easy to communicate with—this powerful computer relieves engineers from routine calculations—frees them for creative tasks.

Data is fed into the 20,000-digit magnetic core memory of the 1620 via punched paper tape. Alpha-numeric output is printed at the console typewriter in desired format, under stored program control.

This new computer with its two-address instruction format and variable field length, gives you up to 50% more storage capacity than a fixed word-length system.

All notations of input and output are in the decimal system. An unlimited decimal field and internal self-checking assure accuracy. A powerful two-address instruction format adds to the 1620's timesaving capabilities.

Programming is simplified through the use of IBM Fortran—a mathematical programming system which compiles machine instructions from algebraic and English language notation. A library of programs for standard engineering computations will also be part of the 1620 package.

Call your IBM representative—ask him to show you all the unique features of the IBM 1620. Like all IBM data processing equipment, this system may be purchased or leased.

BALANCED DATA PROCESSING

IBM®

Balanced Data Processing combines systems and services inseparably to produce performance in the best tradition of more than 45 years of IBM experience. It means more production per data processing dollar for you.

ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

ST. PAUL AMMONIA PRODUCTS, INC., PLANT OPERATING ABOVE DESIGN CAPACITY

Ammonia Plant—Designed, Engineered and Constructed by Lummus—Feeds Natural Gas or Butane

The St. Paul Ammonia Products, Inc., plant at Pine Bend, Minnesota, has been operating continuously at rates above the design capacity of 200 tons per day of ammonia. Lummus' policy of close cooperation with the client at every stage was followed at St. Paul Ammonia. Lummus' extensive experience in plant design and construction has been effectively combined with the experience in plant operation of St. Paul Ammonia's capable staff in order to achieve a successful project.

In addition to producing anhydrous ammonia and ammonium nitrate solutions for the fertilizer industry, St. Paul also produces anhydrous ammonia meeting industrial specifications.

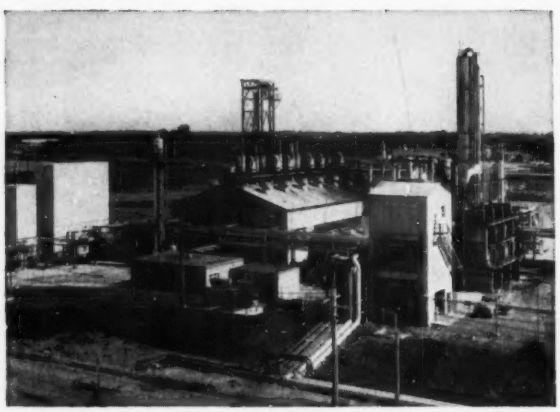
The Texaco Synthesis Gas Generation Process is employed to produce hydrogen for ammonia synthesis. Natural gas direct from the pipeline is normally used as the raw material. However, during the cold Minnesota winters the supply of natural gas is subject to interruption when preference is given to household users. The plant is designed so that at these times butane is used as the raw material.

The large compressors are gas-engine driven and use natural gas fuel except during the winter months, when propane from storage tanks is employed. The Lummus design fits the plant to the needs of the area and permits this sort of flexible operation.

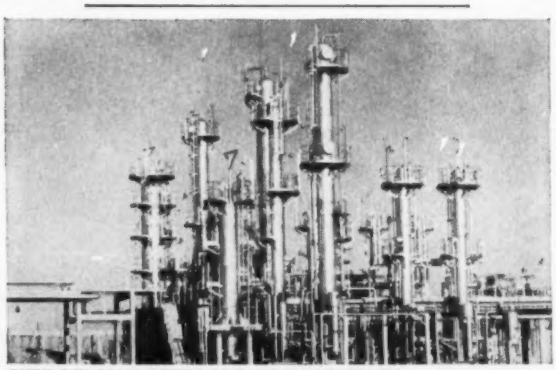
This plant utilizes a hot potassium carbonate system for removal of CO_2 which helps reduce production costs.

Lummus acted as general contractors for the entire project which includes ammonia synthesis, nitric acid, and ammonium nitrate solutions units, and offsite facilities including utilities, tankage and product shipping.

Lummus has experience in design and operation

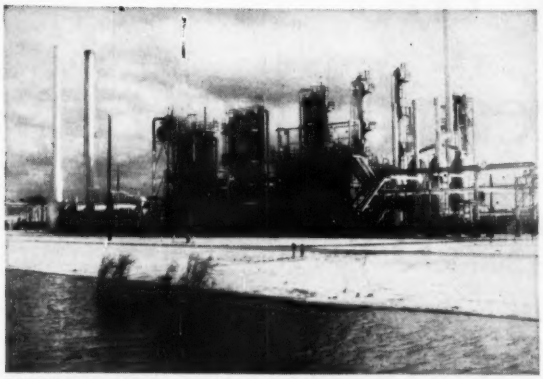


of ammonia plants utilizing natural gas, heavy fuel oil, butane, and waste chlorine cell hydrogen. Capacities of Lummus built ammonia plants range from 60 to 300 tons per day.



NEW BELGIAN PETROCHEMICAL COMPLEX. Lummus has successfully completed engineering and construction of a large group of petrochemical plants, some of which are shown above, for the SOCIETE CHIMIQUES DES DERIVES DU PETROLE-PETROCHIM at Antwerp, Belgium. The complex consists of a phenol acetone plant built to the process designs of The Distillers Company, and cumene and tetramer units whose design and construction are in accordance with the processes of Universal Oil Products Company. The phenol acetone plant is the second in a succession of three such plants built or being built by Lummus in various countries.

Lummus designs, engineers and constructs hydrogen feed gas facility for Air Products, Inc.



WORLD'S ONLY LARGE TONNAGE PLANT PRODUCES LIQUID HYDROGEN FOR USE AS MISSILE FUEL

The world's only large tonnage liquid hydrogen facility — near West Palm Beach, Florida — has been put on-stream by Air Products, Inc. of Allentown, Pennsylvania. The Lummus-designed, engineered and constructed hydrogen production section of the plant has been producing at over-design rate and at 99+% purity (better than design) since the test run was successfully completed 21 days after the initial operation of the gas generators.

The hydrogen production section combines Florida crude oil, oxygen and water to generate hydrogen gas.

Liquid hydrogen product from the new facility assumes an increasingly vital role in the nation's defense system. New capability in handling, storing and firing liquid hydrogen in rocket engines substantially improves our nation's position in the race for missile and space superiority.

Lummus has completed a number of gas generation units in recent years, and also has extensive experience in design, engineering and construction of plants for ammonia synthesis.

In the past 50 years, Lummus has built over 800 plants to produce petrochemicals, chemicals and petroleum products. If your company is planning facilities of this kind, discuss your plans with Lummus.

Over a half-century of Process-Industry experience

Here is just a partial list of chemicals for which Lummus has designed, engineered or constructed plants:

Acetone	Dichlorethane	Nitric acid
Acrolein	Dichlorobenzene	Phenol
Allethrin	Di-isobutyl alcohol	Phthalic anhydride
Ammonia	Ethylbenzene	Polyvinyl alcohol
Ammonium nitrate	Ethyl chloride	Polyvinyl pyrrolidone
Ammonium sulfate	Ethylene	Propargyl alcohol
Benzol	Ethylene glycol	Propylene
Beryllium metal	Ethylene oxide	Pyrrolidone
Bisphenol	Epon® resin	Styrene
Butadiene	Formaldehyde	Sulfuric acid
Butanediol	Heavy water	Surfactants
Butynediol	Hydrogen	Tetramer
Butyrolactone	Hydrogen sulfide	Trichlorethylene
Carbon black	Isopropyl alcohol	Trichlorobenzene
Caustic soda	Lamp black	Toluene
Chlorobenzene	Magnesium sulfate	Uranium oxide
Cumene	Mercuric nitrate	Vinyl acetate
Di-ammonium phosphate	Naphthalene	Vinyl pyrrolidone

Discuss your next chemical or petrochemical project with a Lummus representative.

THE LUMMUS COMPANY, 385 Madison Avenue, New York 17, N. Y.; Houston, Washington, D. C.; Montreal, London, Paris, The Hague, Maracaibo. **Engineering Development Center:** Newark, N.J.

New Developments in Paper Production Discussed in Article by Lummus Consultant

(Reprints available)

Noting that the per capita consumption of paper in this country has increased 333% in the last 35 years, Mr. A. P. Schnyder, a Consulting Engineer for Lummus, has described in a recent article the many new processes and equipment and installation designs that have made it possible for the pulp and paper industry to meet this increased demand.

Some of the new developments discussed in the article include: cold soda, neutral sulfite semi-chemical, and chemigroundwood pulping processes which broaden the pulpwood supply to include hardwoods; the introduction of chlorine dioxide as an added bleaching agent to increase pulp brightness to over 90%; and the variety of digester assemblies devised to convert from batch to continuous operation. Copies of the article can be obtained from Lummus.

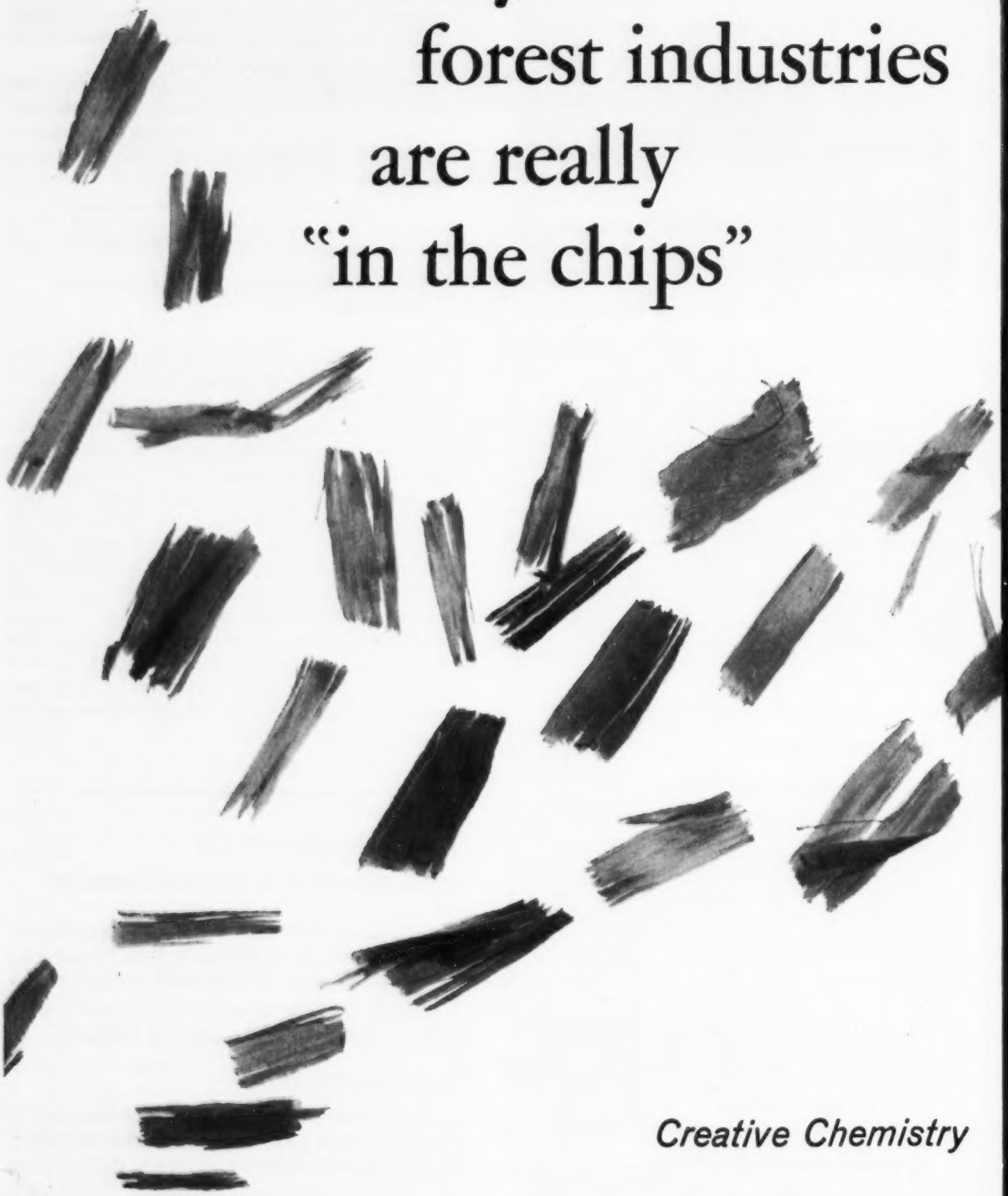
Increased demand leads GAF to expand facilities for Acetylene Derivatives

Increasing demand for its new acetylene derivatives has led General Aniline & Film Corporation to expand its production facilities at Calvert City, Kentucky. GAF has awarded the contract for the expansion project to The Lummus Company.

First Plant of Its Type

The original plant, completed three years ago by Lummus, was a pioneering achievement of design, engineering and construction; it was the first plant for full-scale commercial production of high-pressure acetylene chemicals built in the U. S. A.

Why the forest industries are really "in the chips"



Creative Chemistry

"We're in the chips because, for one thing, we've learned to use chips instead of burning them! We've discovered a new product that can be produced economically and in great quantity. *The future of particle board is fantastic!"*

— The Editors, Hitchcock's WOOD WORKING (italics ours)

This statement is typical of the observations made by editors and writers who have analyzed the booming particle board industry. And as a principal supplier of the high quality bonding agents so vital in particle board production, Reichhold has been closely involved in this success story. In fact, RCI adhesives specialists actually studied requirements and came up with authoritative recommendations for a number of manufacturers *before* their plants were in operation!

Nor is this "from-the-ground-up" participation by RCI restricted to the particle board industry. Plywood production and furniture-making are two more areas in which Reichhold's broad experience and full line of adhesives have been put to good use by manufacturers — time and again, to help solve a wide variety of problems.

This concept of total service on the part of the forest industries' suppliers is a vital ingredient in maintaining dynamic growth. It helps explain, too, how Reichhold's "creative chemistry" has indeed been a "partner in progress". Many times over! And RCI will continue to be a partner — *your* partner, possibly — in the success stories that are waiting to be written in the "skyrocketing" sixties!

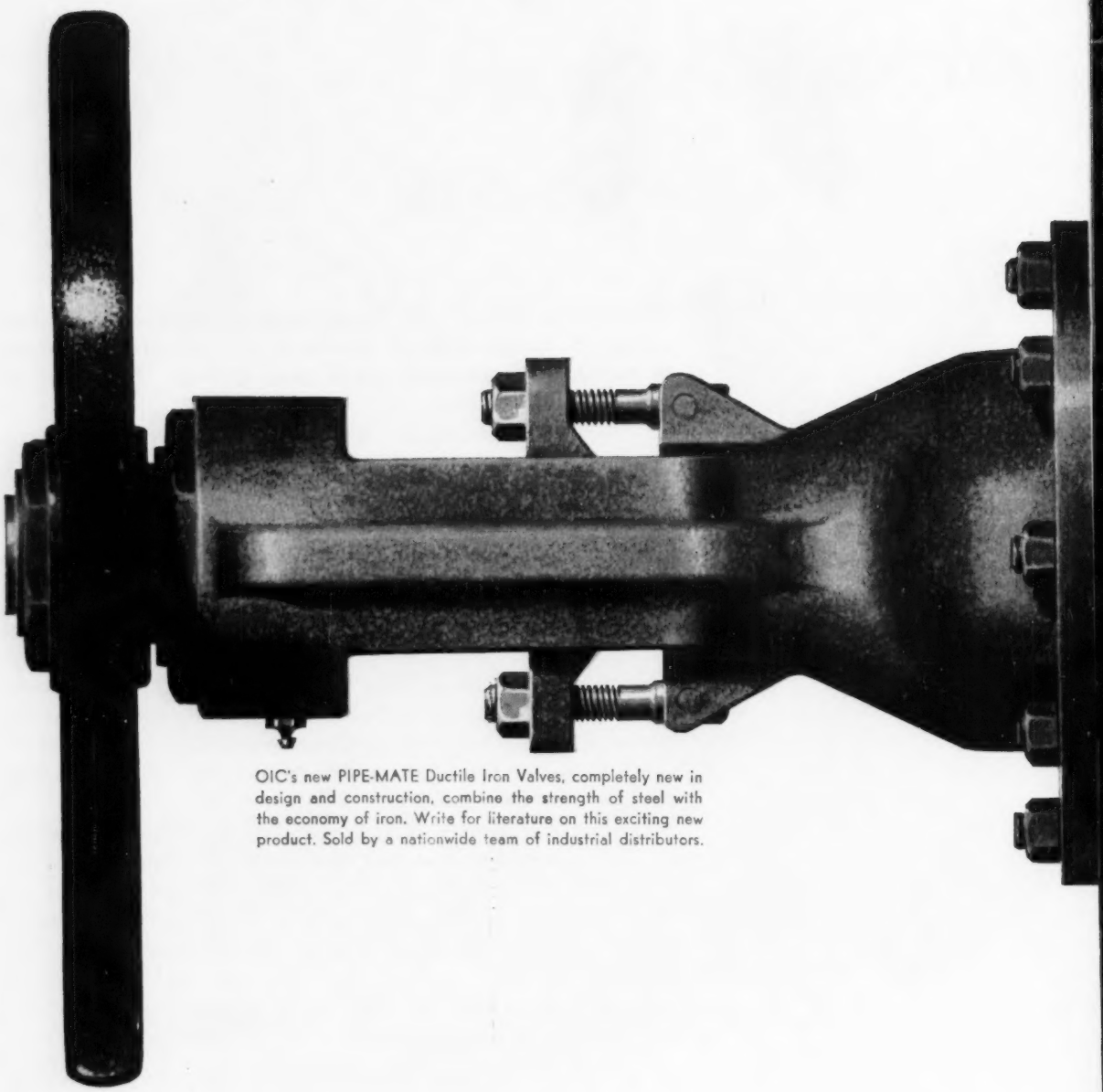
REICHHOLD CHEMICALS, INC.
RCI Building, White Plains, N.Y.

Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol
Hydrochloric Acid • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sebacic Acid • Ortho-Phenylphenol • Sodium Sulfite • Pentaerythritol • Pentachlorophenol
Sodium Pentachlorophenate • Sulfuric Acid • Methanol

RCI

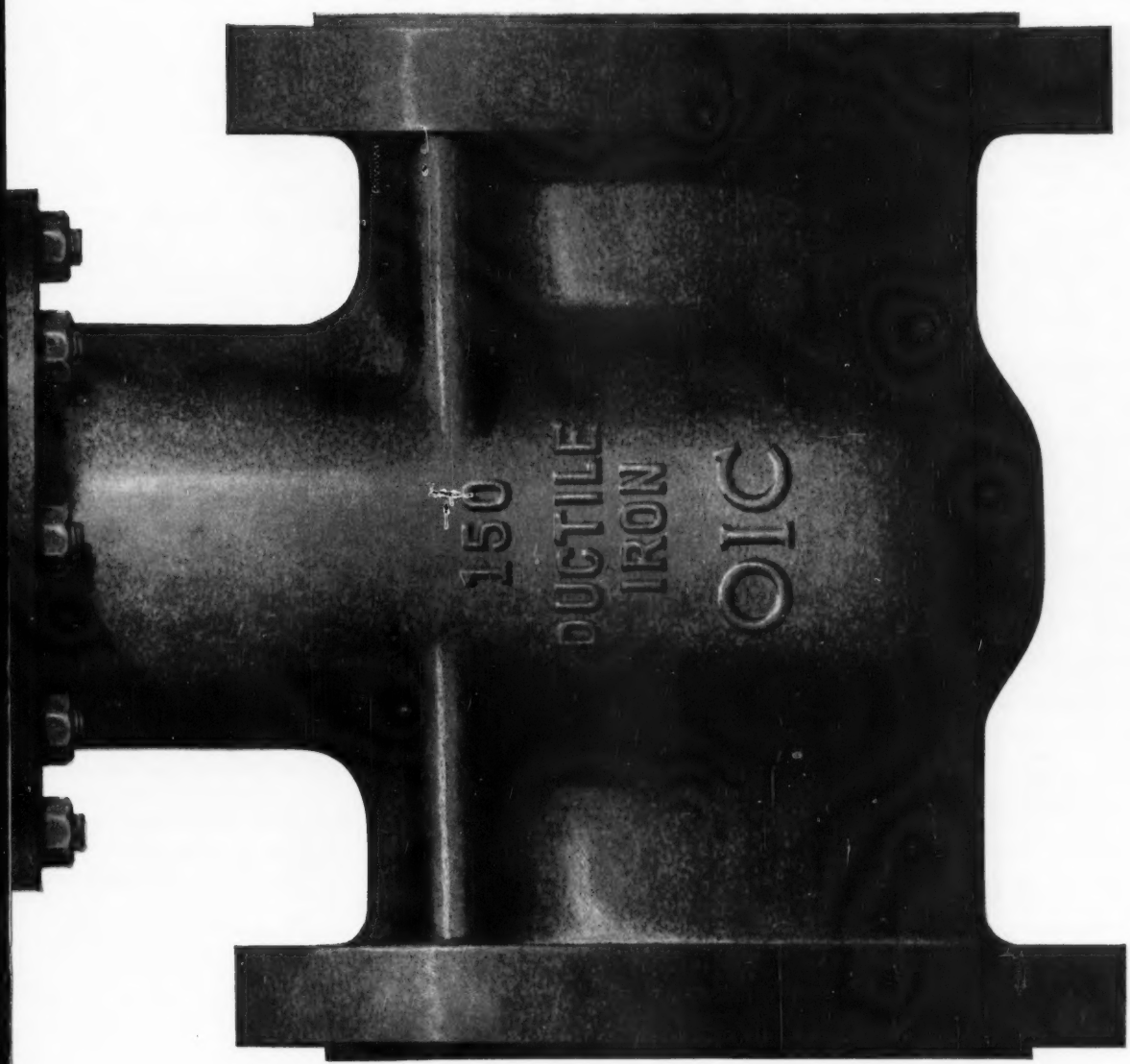
...Your Partner in Progress

REICHHOLD



OIC's new PIPE-MATE Ductile Iron Valves, completely new in design and construction, combine the strength of steel with the economy of iron. Write for literature on this exciting new product. Sold by a nationwide team of industrial distributors.

LEADERSHIP is the sum of many things . . . quality products, dependable service, integrity of policy . . . but most of all, eagerness to develop new ways of serving customers better. At OIC today, you can almost feel that sense of leadership rising like a tide in many areas of our work . . . pride of workmanship in the plant . . . the vigorous sense of service among our people in the home office and in the field . . . a new and youthful spirit in a company with more than 75 years of solid



experience. Specifically, OIC has a new story to tell about valve marketing—one that has prompted many of our customers in the petroleum and chemical industries to tell us: "Now you're talking *our* language." If valves are big and vital items among your purchases, it will pay you to get the facts on the new OIC approach to valve marketing. When can we get together?

OIC VALVES

FORGED AND CAST STEEL, BRONZE, IRON AND DUCTILE IRON VALVES

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

Berries Bright Side

THE CRANBERRY DEBACLE (*see also p. 42*) is a blessing in disguise for the chemical industry, however hard it may be on the innocent majority of cranberry growers.

Although we feel that the Food & Drug Administration has come up with another of its all-too-frequent regulatory excesses, we cannot impugn the agency's motives. (We feel, however, that FDA is on technically shaky ground, since a person would have to eat 2 qts. of cranberries every day for 23 years to reach the feeding-test levels at which the weed killer, aminotriazole, initially proved harmful to rats. And nobody, but nobody, eats that many cranberries.)

We are also disturbed that FDA has decided that the harmless *per se* doctrine on carcinogens is wise. We feel that industry should not have agreed to such a provision in the food additives law, as we pointed out in a previous Viewpoint (*July 25, p. 14*). But this error is a side issue.

The important thing in the cranberry case is this: agricultural chemical makers have long suspected that many people do not read the instructions for using a pesticide. When someone's backyard garden is involved, such misuse, however unfortunate, is not of broad public concern. But when a pesticide is misapplied to large-scale crops, misuse can be a real public health problem.

Moreover, the monetary loss to all cranberry growers will be a real lesson to any food-crop producer who tries to make a few extra dollars by misapplying a pesticide just before harvesting —when there's a risk of a residue at too high a level.

Pesticides are a real aid to modern agriculture, as well as a source of profit to the chemical industry. But if users don't follow instructions, pesticides are no bargain to anyone.

Now, at least, anyone tempted to misuse a pesticide will have to remember what happened to the cranberry industry.

H. C. Johnson

Editor-in-Chief

New York—Chemical Hub

THE HUB OF THE CHEMICAL WORLD this week will most assuredly be New York, where some 40,000 process industries people will make their way through the Chemshow—the 27th Exposition of Chemical Industries.

To those who will make their first Chemshow visit this year—welcome. We hope you'll find it profitable. Those making a return visit wouldn't be coming back if it weren't worthwhile. We believe all visitors will find the special Chemshow section *(pp. 51-154)* of this issue a worthwhile companion for the journey to the Coliseum. For your convenience, this section is specially bound so that it may be easily detached from the issue.

Highlight of the week: The award dinner at which CHEMICAL WEEK's first Kirkpatrick Award for Management Achievement will be presented to Food Machinery and Chemical Corp.

We at *CW* are happy to honor FMC's management achievements. But it will also be a time for regrets, since the occasion will mark the impending retirement of Sid Kirkpatrick, editorial director of CHEMICAL WEEK and *Chemical Engineering*. We will miss him.

Two other familiar faces will attend the banquet in new functions. John Callaham, who succeeded Sid as chief editor of *Chemical Engineering*, will attend in his new capacity as vice-president and editorial director of McGraw-Hill's Publications Division. He will be seconded by his own successor as editor-in-chief of *CE*, Cecil Chilton—a key figure in the evening's program.

These men and this event will make next week a memorable week for New York—as the chemical capital of the world.

Photomicrograph of a Polypropylene crystal

AMERICAN VISCOSE CORPORATION and SUN OIL COMPANY

announce the formation of

*

AVISUN

. . . now producing commercial quantities of the newest and fastest-growing plastics material

*a trademark of AviSun Corp.

AVISUN

Polypro

. . . the new thermoplastic with properties that open exciting new opportunities in molding, extrusion, and film and fiber manufacturing.

Offering superior performance in many conventional thermoplastic applications, AviSun Polypropylene also promises new advantages in the production of end products heretofore impossible or impractical because of physical or economic limitations. Its structure and molecular weight can be tailored to make polymers with optimum physical and chemical properties. AviSun Polypropylene offers up to 50% more product per pound of resin, because it's the lightest commercial plastic material known. This new plastic will be produced by AviSun Corporation in three forms . . . polymer, film and fiber.

POLYMER

Molds and extrudes readily . . . is especially adaptable for thin-walled and intricately shaped articles. End products show fine detail, high finish, hard surface and excellent rigidity . . . have great resistance to acidic, alkaline and saline solutions. With a 330°to340°Fmeltingpoint, Polypropylene products can be sterilized, and used at temperatures up to 300° F. Essentially nonpolar, and virtually unaffected by humidity, AviSun Polypropylene has excellent dielectric properties . . . makes superior insulation. Tensile and compressive strength are very high.

FILM

AviSun Polypropylene film has exceptionally high tensile strength and especially low permeability to most vapors, gases, mineral oils and vegetable oils. It exhibits high brilliance and clarity. It can be heat sealed on conventional polyolefin equipment. The stability and high quality of the polymer assures the uniformity and performance of the film. The abrasion resistance of polypropylene is superior. This is especially important in durable and decorative packaging film—polypropylene's high gloss is long lasting.

FIBER

AviSun Polypropylene can be made into monofilament and multifilament yarns which offer outstanding abrasion resistance, strength, elasticity and creep resistance.

AVISUN

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pylene

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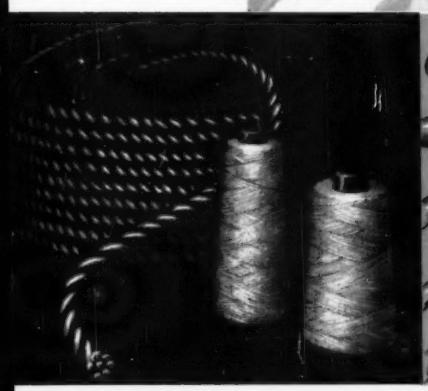

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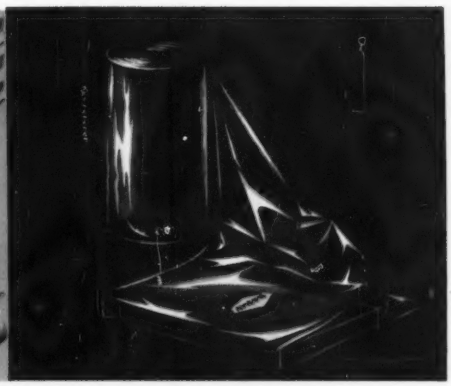

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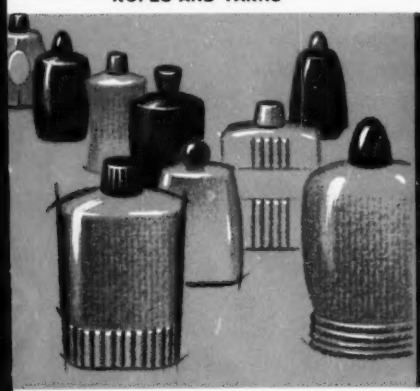

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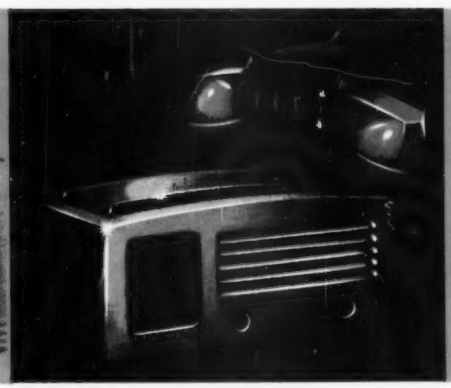

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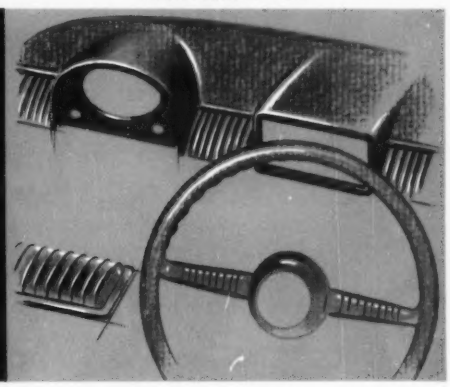

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Business Newsletter

CHEMICAL WEEK
November 21, 1959

Major problems besetting the plastics industry—integration and government regulation—are getting attention from various sources this week.

At Chicago, Hercules Powder Co. attorney John Kuniholm told the Chemical Market Research Assn. (*see p. 175*) that time and expense of complying with government regulations should be regarded as an increasingly important cost factor, affecting end-use applications just as do the traditional market forces—price, quantity, technical suitability.

And in New York, on Dec. 4, more regulations are to be drawn up—this time for the fluorocarbon industry. The Federal Trade Commission says marketing of substandard products has been a principal cause of complaints. It's inviting cooperation of two big resin producers, Du Pont (Teflon) and Minnesota Mining & Mfg. (Kel-F), and the 350 fluorocarbon molders in writing trade-practice rules.

As to integration in the plastics industry, Foster Grant's John LaBelle, speaking to CMRA, predicts that it will take place most rapidly in the older, established plastics. But it will cause no serious industry upheaval, he said. The integration trend could limit the number of new entries into petrochemicals; and it's likely to hurt operators who fail to watch costs or who place too low a value on their products.

•

The West Coast plastics industry is getting a twofold boost:

• A new producer of polyurethanes — at Los Angeles — is launching its initial financing—an $850,000 stock offering. Urethane Corp. of California (San Francisco)—armed with a Mobay license, Mobay's one-shot catalyst, and a German-built, 120-lbs./minute flexible urethane foam-producing machine—aims to market polyether foams for furniture and auto applications along the West Coast and in Alaska and Hawaii.

• Sparked by the blow-molded bottle boom for detergents, Monsanto's Plax Corp. division will construct a high-density polyethylene bottle plant at Anaheim, Calif., where Monsanto owns 18 acres. Plax says that after one year it will also produce extruded styrene sheets for fancy food packaging.

•

The growth trend in both synthetic rubber and polystyrene applications has resulted in plans for a 200-million-lbs./year styrene monomer production increase by Monsanto. First stage of its new Texas facilities is expected to be in operation in first-quarter '61, with the company driving for substantial new styrene penetration into the packaging, construction, automobile, appliance and record markets.

Hercules Powder is betting again on polypropylene. It has picked Lake Charles, La., as the site for its second resins plant. Propylene will be supplied by Petroleum Chemicals, Inc. (*CW, Nov. 14, p. 67*). The new plant's capacity will be in excess of 100 million lbs./year. But it will be so designed that the first unit (50 million lbs.) can go onstream in early '61, prior to completion of the entire facility. Fiber, film and molding resins will be produced.

•

Carbon bisulfide gets a vote of confidence from Stauffer Chemical. It's building another plant—this one at Delaware City, Del.—using the methane process tried out in its bisulfide plant at LeMoyne, Ala. Capacity and costs were not revealed. Stauffer is a major producer of bisulfide, used mainly in rayon and cellophane production.

•

The proposed $100-million chemicals-from-anthracite venture of Philadelphia and Reading Corp. and General Dynamics (*CW Technology Newsletter, Sept. 26*) is making headway. P&R President Howard Newman told the Bond Club of Baltimore last week that the joint subsidiary will probably be incorporated by the end of this year; and ground breaking for its plant is expected to follow in the early spring. Final tests in Lurgi gasifiers and carbide furnaces have been completed in Europe and are being evaluated. The results will pinpoint the company's capital needs.

Final decision on production capacity will hinge on test results and on current contract negotiations with prospective long-term customers. Right now, Newman says, it looks as though the complex will produce 50 million cu. ft./day of hydrogen and synthesis gas. A "substantial tonnage" of calcium carbide and a large, integrated power station may be in production 18 months after construction starts, but it will probably take close to three years to reach full production, Newman reports.

•

While the chemical industry gets relief from the break in the steel strike (*p. 26*), several unions are kicking up their heels at CPI plants.

Management won a victory in the 134-day strike of members of the Oil, Chemical & Atomic Workers at American Oil Co.'s El Dorado, Ark., refinery. Key issue: management discretion over work rules. Negotiations had been stalled for a month on a single clause, giving management the right to assign a worker temporarily to duties outside of his job classification. The workers voted in favor—over objections of representatives of the international union. The new contract includes some upward wage adjustments and a one-year wage reopener clause. But the OCAW strikers are holding fast at Amoco's Texas City plant, where they've been out since July 1.

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Steel's Strong Startup Triggers

With steel production up to about 75% of capacity this week, and coal chemicals issuing in mounting volume, the stage is set for a strong upturn in chemical sales.

Despite the four-month-long lull in steel production and the sweeping cutback in motor vehicle output, it now appears that 1959 sales of chemicals and allied products will come to about $25 billion—more than 7% higher than in any previous year (*chart, right*).

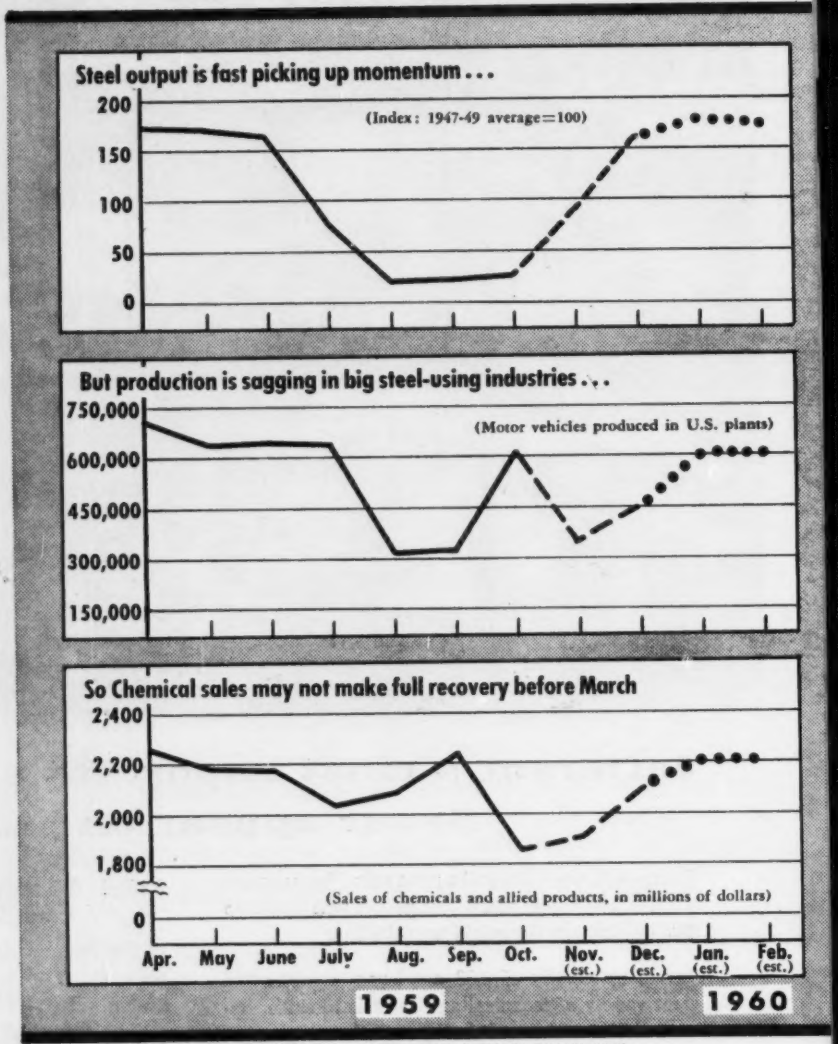
But the big question is what will happen in the January-to-March period. Millions of dollars of first-quarter chemical sales—the difference between profit and loss on some operations—hinge on whether the government can prod the steel industry and union negotiators into a new labor contract before the 80-day Taft-Hartley injunction expires on Jan. 26.

This year's steel walkout—which shut down 87% of the industry for 114 days—was beginning to produce serious dislocations in chemical supplies and markets. And chemical companies' sales and earnings were definitely sliding last week.

But for a couple of months, at least, molten metal will be spewing from the big blast furnaces. Here's the chemical industry's situation, delineated from spot-checks late last week:

• Coal chemicals are coming out in near-normal volume now, although shipments to customers have been skimpy thus far. Steel companies say supplies generally will be adequate by next month. But naphthalene and benzene are in seriously short supply right now, and the consensus of chemical management is that these shortages are not going to be quickly cleared up.

• Chemical sales are rising—but not so steeply as steel production. Reason: the present dearth of steel is upending production schedules in certain other pivotal industries. Classic case in point, of course, is the auto industry, which this month is running 50% behind production schedules. Reverberations are being felt in the rubber, paint, glass and aluminum industries—among other major consumers of chemicals.

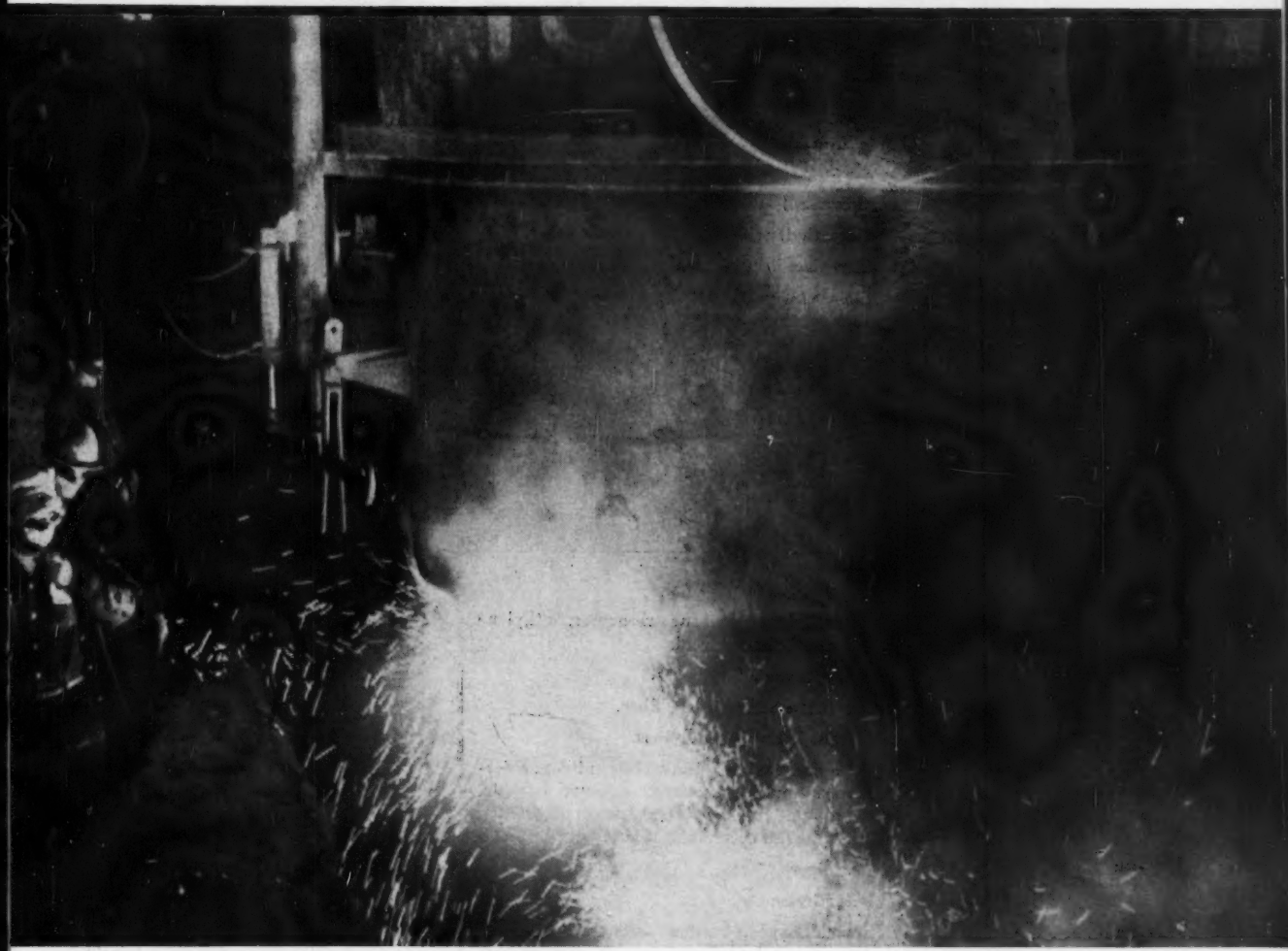


• • • ASSUMING THAT STEEL MILLS CONTINUE IN PRODUCTION.

• So far, very few chemical plant projects have been stymied by lack of steel—but more trouble of this kind will likely be felt this month. Makers of process plant equipment began to be pinched in October. Anticipating a considerable delay before steel supply pipelines are again filled, equipment manufacturers are promising delivery "so many days" after the end of the steel strike. And a number of chemical companies have been holding up on expansion projects, waiting to see exactly how and when the strike is settled.

Naphthalene Worries: The chemical industry's most pressing single problem arising from the strike is the scarcity of naphthalene. Some industry men fear that the paucity will continue for as much as six

Swift Upturn in Chemical Sales



Comeback in steel output is faster than expected—but comes too late to avert auto plant shutdowns.

WIDE WORLD

months, even with no further interruption in steel industry operations. More cheerful observers predict that the naphthalene tide will turn in about 90 days. It seems certain that very little naphthalene or phthalic anhydride—naphthalene's principal derivative—will be going into inventory before March.

In the past few weeks, phthalic producers have been trying diverse expedients, none of which has been satisfactory. Imported naphthalene has been expensive and unreliable; petroleum-industry naphthalene is not yet available in substantial quantity; and use of ortho-xylene as starting material for phthalic production has led to mechanical difficulties.

For chemical companies, there are some profound uncertainties in the coming year, even if the steel mills stay in operation from now on. One vital question is how much certain key industries will boost first-quarter production to make up for current cutbacks; often, production lost in the fall is lost forever. Among negative factors: the high level of interest rates, and the downward trend in residential construction.

Nevertheless, most economists feel that these are outweighed by various positive factors—most immediate of which is the over-all stimulus to the economy of the faster-than-expected resumption of steel operations. Good bet: 1960 chemical sales may well clear $26 billion.

Japanese Producers

The 'Big Three's' Principal Chemical Affiliates

	'58 Sales million dollars	Principal Products
MITSUI GROUP		
Toyo Rayon	152	Rayon products, nylon products, synthetic fibers.
Toyo Koatsu	57	Fertilizers, industrial chemicals, resins.
Toa Synthetics	37	Fertilizers, caustic soda, nylon, industrial chemicals, resins.
Kyowa Fermentation	33	Solvents, streptomycin, esters, etc.
Mitsui Chemical	32	Polyethylene, dyestuffs, intermediates, etc.
Denki Chemical	30	Fertilizers, industrial chemicals.
Ube Soda	12	Soda ash, caustic soda, ammonium chloride, sodium, silicate, etc.
Japan Hydrogen	11	Fertilizers, industrial chemicals, methanol, formaldehyde.
Miike Synthetics	10	Coke, tar, benzene, carbon black, synthetic detergents, phthalic, sulfur, thiourea.
Nitto Ryuso	9	Fertilizers, industrial chemicals, oil and fat products.
*Mitsui Petrochemical	4†	Ethylene, polyethylene, ethylene oxide, ethylene glycol, phenol, acetone.
MITSUBISHI GROUP		
*Mitsubishi Petrochemical	—††	Polyethylene, styrene monomer, ethylene oxide, ethylene glycol.
Ube Kosan	84	Cement, coal, fertilizers.
Asahi Kasei	71	Rayon yarn, synthetic fiber.
Asahi Glass	62	Alkali products, flat glass.
Mitsubishi Chemical	56	Coke and coal tar derivatives, nitrogen fertilizers and derivatives, calcium carbide, dyes and intermediates, pharmaceuticals, agricultural chemicals, reagents, TNT, etc.
Tohoku Fertilizer	10	Fertilizers.
*Mitsubishi Monsanto	10	Polyethylene.
Edogawa Chemical	9	Formaldehyde, barium salts, phenolic and urea resins, hydrogen peroxide, sodium perborate, formic acid, oxalic acid, sulfuric acid, muriatic acid, caustic soda, etc.
SUMITOMO GROUP		
*Sumitomo Chemical	86	Fertilizers, industrial chemicals, dyestuffs, pharmaceuticals, synthetic resins, polyethylene, PVC, ethylene.
Sumitomo Bakelite	11	Phenol, urea, melamine, vinyl chloride, polyethylene products.
Befu Chemical	9	Fertilizers, sulfuric acid, liquid ammonium, ammonium bicarbonate, liquid carbon dioxide, liquid sulfur dioxide, sodium-bisulfite, methanol, nitrous oxide, etc.

*Member of Japan Petrochemical Assn. † Onstream April '58. †† Onstream April '59.

Japan—now readying for a new spurt of petrochemical expansion—offers a prime illustration of the kind of unfamiliar business practices faced by U.S. companies venturing overseas. In petrochemicals, at least, cooperation—not competition—is the keyword.

Japanese petrochemical producers have spent about $230 million in plants in the past five years, are seeking government approval for another $390 million in petrochemical investments during the next five years.

Chances are that a U.S. chemical producer trying to share in this expansion—by investments or licensing—would find himself doing business with some affiliate of one of the three big zaibatsus ("money cliques")—Mitsui, Mitsubishi or Sumitomo—which account for at least 60% of Japan's total chemical sales. To understand the Japanese chemical industry today, you have to understand the zaibatsus.

Roots: Originally, the zaibatsus were vast, family-owned industrial empires, born out of Japan's 19th century industrialization. After World War II, they were broken up into hundreds of splinters by the U.S. military forces, their stock sold to the public.

The splinters immediately set about regrouping—first as secret "social societies," and then, after the 1952 peace treaty, through open financial integration. Today, the hearts of the zaibatsus are still the trading companies—Mitsui Bussan, Mitsubishi Shoji, and Sumitomo Shoji—and their affiliated banks (Sumitomo's chemical operations rank third, although it's only the ninth-largest trading company). But they are no longer financially controlled by the parent companies.

Most of these three groups' major chemical affiliates (*table, left*) started out with capital participation from their parent firms or were bound by interlocking directorships. There are still a few such links. But now most links connecting parent firms and affiliates are indirect. For example, nine Mitsui group companies each hold a little over 10% in Mitsui Petrochemical, although the trading company no longer has financial interest in any of these firms. Also

Team Up for Petrochemicals Push

within the Mitsui group, Toyo Koatsu is the biggest shareholder (12.5%) of Miike Synthetics, although the trading company holds no direct financial interest.

Ownership is more tightly held in the Mitsubishi group. Mitsubishi Chemical has a 50% share in Mitsubishi Monsanto, a 20.1% share in Tohoku Fertilizer, and an 18.5% share in Asahi Glass. The Mitsubishi Bank, in turn, owns 18.5% of Mitsubishi Chemical, and various Mitsubishi firms own 75% of Mitsubishi Petrochemical.

Within the Sumitomo group, the parent companies have no financial interest in the three chemical firms listed, although Sumitomo Chemical has a 49.2% share of Sumitomo Bakelite.

Quiet Understandings: The working relationships among all the zaibatsu members is still largely a mystery to outsiders. Probably the main bonds are the understandings reached by the executives who still attend the "social" gatherings of Mitsui's Monday Society, Mitsubishi's Friday Society, and Sumitomo's White-Water Society.

These work out into marketing and licensing arrangements between the member companies. (Each of the zaibatsus embraces a broad range of industries in addition to chemicals and many more smaller chemical companies than are listed in the table.)

Mitsui Chemical, for example, serves as a sort of executives' training ground for other companies in the Mitsui group. Toyo Koatsu, Japan's largest fertilizer producer, no longer is subsidiary of Mitsui Mining, but has intimate supply and marketing ties to the group. And Sumitomo Chemical gets its sulfides and sulfuric acid from Sumitomo Metal Mining, and its coal from Sumitomo Coal Mining, while it sells the bulk of its aluminum output to Sumitomo Metal Industries and Electric Industries.

For all of the chemical producers, of course, connection with the big trading companies means open channels to world markets.

Over the Fence: The loosening of direct ownership ties has helped temper the formerly fierce competition between the zaibatsus. The postwar period, in fact, has seen cooperation between them. Thus, the Mitsubishi Bank put up 20% of the $6 million that went into setting up Mitsui Petrochemical. And to produce acrylonitrile textiles, Sumitomo Chemical formed (in partnership with Toyo Spinning) Nippon Exlan, Japan's largest textile company and a member of the Mitsui fraternity.

In petrochemicals particularly are the zaibatsus showing their new, friendly faces. Japan's petrochemical producers are united under the banner of the 13-member Japan Petrochemical Assn., headed by Mitsubishi Petrochemical President Kamesaburo Ikeda.

Petrochemical chief Ikeda: 'Competition among ourselves? Ridiculous.'

Behind this cooperation is the sense of competition with more advanced producers in the U.S. and Europe, the producers' dependence on foreign technology, and the government's control of all expansion and foreign tie-ups.

In their swing into petrochemicals, the Japanese see themselves competing more with U.S. producers than with each other to cut costs and step up production. They figure they are 10 years behind the British and 30 years behind the U.S. Production costs are 150-200% above those in the U.S., and interest rates are 20% higher. Japan still depends on petrochemical imports to fill all its fast-growing needs.

"Our problem," Ikeda says, "is that we are producing new products faster than our clients find out what to do with them."

The association promotes use of the new products. It also coordinates the industry's expansion plans. It serves as liaison between the members and the government, negotiates with foreign technical and equipment licensors, and promotes technical cooperation between members.

More Building Ahead: Already, domestic production has saved Japan from spending $120 million or more for petrochemical imports. Producers are eager to make greater advances over the next five years. Fifteen additional companies may join the petrochemical association, depending on government approval.

Of the $390 million proposed for expansion outlays during the next five years, however, the government is expected to approve less than half.

The second five-year program will be announced early next year. It will reportedly be built around alkylbenzenes, polypropylene, propylene glycol, tetraethyl lead, acetylene, butanol, octanol, acrylonitrile, ethylene, polyethylene, ethylene glycol and terephthalic acid.

To what extent U.S. producers will be allowed to participate in these ventures is still not known. So far, most U.S. participation has been limited to licensing processes. Japan has been wary of permitting joint ventures, contends that remittance of profits would drain the foreign exchange reserve.

Nevertheless, there have been a number of joint ventures between Japanese and foreign firms, and more are sure to follow.

Marking Up Mergers

Another flurry of acquisitions this week accents the continued trend toward both integration and diversification in the CPI.

Among the newsmakers was Ashland Oil & Refining Co. (Ashland, Ky.), which purchased Louisville Refining Co. and its Owensboro subsidiary, Producers Pipe Line Co.

Central Chemical Diversifies: And an Ohio fertilizer concern is now under new management. Central Chemical Corp. (Hagerstown, Md.) has acquired both plants of Greenleaf Fertilizer Co. at Lockwood and Andover, O. In addition to fertilizers,

Central will produce a line of agricultural chemicals at these newly acquired plants.

Another producer recently acquired by Central: Koller Fertilizer Co. (Glen Rock, Pa.).

In Pharmaceuticals: While Smith Kline & French Laboratories (Philadelphia) disclosed its plans to acquire Norden Laboratories (Lincoln, Neb.), manufacturer and distributor of veterinary pharmaceuticals and biologicals, Strong Cobb Arner, Inc. (Buffalo, N.Y.) reported acquisition of assets and business of Pan Pak Inc. (Attica, N.Y.), producer of dental anesthetic in aerosol form.

New Union Offensive

Leaders of AFL-CIO's two chemical unions have suddenly become the men to watch in aggressive new campaigns by the federation's industrial unions. The chemical industry is a top target.

The two union presidents—Walter Mitchell of the International Chemical Workers Union and O. A. (Jack) Knight of the Oil, Chemical & Atomic Workers—stepped into the forefront at last week's convention of the federation's giant Industrial Union Dept. in Washington.

They pressed IUD to take a big first step into a new production union organizing program, and to launch a new offensive against AFL-CIO's rival craft unions. Both campaigns would aim at opening up nonunion territory.

The convention, anxious to avoid a direct challenge to AFL-CIO President George Meany, put off for executive committee study Mitchell's resolution calling on IUD to set up its own membership drive among industrial unions, providing financial assistance to those taking part. But it agreed that the industrial unions should begin searching out nonunion territory on their own. First goals: white-collar workers, along with chemical, oil, textile, and state and local government employees in prime unorganized areas.

The convention passed with a voice vote Knight's resolution condemning AFL-CIO's jurisdictional machinery, organizing tactics by the craft unions, union boycotts of rival union products, and name-calling in rival organizing campaigns.

Drug Firms' Triple Riposte

Pharmaceutical companies were holding their own this week in three legal forums, with the start of the Kefauver drug-pricing hearings now less than three weeks away.

While Parke, Davis & Co. defended its price maintenance policy before the U. S. Supreme Court at Washington, Salk vaccine makers pressed for dismissal of the price-fixing conspiracy charges now being tried at Trenton, N.J. Meanwhile, "third party" distributors stressed competitive bidding at the Federal Trade Commission's New York hearing on a similar complaint aimed at producers of broad-spectrum antibiotics.

Shunning or Boycott? All nine Supreme Court justices listened to Daniel Friedman of the Solicitor General's staff argue for the government that Parke, Davis—attempting to maintain resale prices in non-"fair trade" Virginia and District of Columbia—went far beyond the dictum in the 1919 Colgate case: a seller does not violate antitrust laws merely by making a simple refusal to sell to customers who will not resell at prices fixed by the seller. On the contrary, Friedman contended, P, D "engaged in a boycott," using economic pressure to get retailers to go along on prices.

At stake, as antitrusters see it: Can manufacturers enforce fair-trade practices in non-fair-trade areas without violating the antitrust ban on price conspiracies? The government has twice lost on this issue in lower courts; and as defense counsel Gerhart Gesell sums it up: "No seller who strictly follows what the Colgate decision allows, can ever stop price-cutting —we never were able to . . . never did."

Salk Windup: In Trenton, the government was winding up its case by calling up more of its 29 witnesses on price fixing. Defendants' strategy was to work into the record as much of its own case as possible during cross examination. Object: when Judge Phillip Forman considers the expected dismissal motion, he will already have before him a substantial portion of the defendants' rebuttal.

This week the government tried to prove that domestic prices were uniform, that foreign prices were not. The government's final witness—New York state purchasing agent Ronald Slocum—was expected to testify that he had received identical bids (1) when he sought to purchase vaccine on a unit price basis or on a contract basis, (2) regardless of delivery distances, and (3) even when he specified vaccine within six months of its being outdated. Armed forces purchaser Walter K. Mazzone was slated to testify that he was unable to get quantity discounts on contracts.

'Free Goods' Unrestricted: Stressing the competitive nature of pricing policies at the FTC New York tetracycline pricing and patents hearing, five Pfizer witnesses revealed that there were virtually no restrictions on the amount of "free goods" that Pfizer salesmen could use to get a contract. Among the witnesses: Bernard Harris, owner of Broadway Medical Supply (Chicago); and Samuel Berow, Pfizer antibiotic marketing manager and former Philadelphia district sales manager.

Harris said the drug was always invoiced to him at Pfizer's list price, but he often made bids at lower rates. At month's end he was given enough "free goods" to compensate for "surface losses" and give him a promised 4-5% profit. On the other hand, Pfizer's Berow testified that in Philadelphia, Drug Distributors' Sol Tornoff, a third-party bidder, frequently was low bidder. And, stated Berow, Tornoff never specified what brand of tetracycline he would supply until awarded a bid. Then he would negotiate with manufacturers for the required quantity at the lowest price, said Berow. In most cases, he said, Drug Distributors invoiced at published price, but received additional quantity of the drug in the form of free goods.

Scheduled as first Bristol Laboratories witness this week: President Frederic Schwartz. He leads off in what is expected to be a three-week defense, which would make it impossible to wind up the hearing by the Dec. 23 deadline. Hence, additional sessions probably will be scheduled for late January and February to complete the producers' cases, give FTC prosecutors a rebuttal period.

COMPANIES

Jefferson Lake Sulphur Co. (New Orleans) has exercised its option to acquire from American Asbestos Co. (New York) a major deposit of chrysotile asbestos near Stockton, Calif. Jefferson's exploration work has proved about 15 million tons of commercial ore. Plans: immediate installation of mining equipment and a 2,000-tons/day mill.

•

Celanese Corp. of America has leased eight floors of the new Morgan Guaranty Trust Co. building now under construction at 522 Fifth Ave., New York. Celanese plans to move its executive offices from 180 Madison Ave., New York, to the new address in the middle of '61, will sublease two of its eight floors.

•

St. Regis Paper Co.'s two new acquisitions—Lone Star Bag and Bagging Co. (Houston, Tex.) and Wagner Bag Co. (Salt Lake City)—will continue operations as subsidiaries of St. Regis, under present management. Wagner is completing a new plant for textile and multiwall bag operations.

EXPANSION

Carbon Black: Phillips Chemical Co. will build a 60-million-lbs./year carbon black plant near Orange, Tex. Completion is scheduled for third-quarter '60. The new unit will produce both Philblack O and I, tradenames for the Phillips product. Capacity of Phillips' present plant near Borger, in the Texas Panhandle: 290 million lbs./year.

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Cement: Calaveras Cement Co., a Flintkote Co. division, will construct a $14-million, 1.5-million-bbls./-year cement plant at Redding, Calif., on a 1,500-acre limestone and shale site. Completion date: March '61.

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Chlorine, Caustic Soda: Olin Mathieson Chemical Corp. (New York) will soon begin a multimillion-dollar expansion at McIntosh, Ala. Included: a third cell bank, making possible a 50% production increase of chlorine and caustic soda from salt brine.

•

Industrial Gases: Air Reduction Sales Co. (New York) will build a new air-separation plant to supply oxygen by pipeline to Tennessee Coal & Iron Division of U.S. Steel at Fairfield, Ala. Another plant for production of gases from the atmosphere is being erected at the same location. Total capacity: 145 tons/-day of high-purity industrial gases. Completion is expected within 18 months.

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Glass-Fiber Yarns: Owens-Corning Fiberglas Corp. is planning to construct a several-million-dollar Fiberglas yarns plant on a 350-acre site at Aiken, S.C. Initial production of the first units is scheduled for next June; completion of the entire plant is slated for third-quarter '60.

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Petroleum Products: Several Canadian firms (Canadian Oil Companies, Calgary and Edmonton Corp., Canadian Superior Oil of Calif., Imperial Oil, Security Freehold Petroleums and Hudson's Bay Oil and Gas Co.) jointly are planning huge crude oil processing, gas-treating and sulfur recovery facilities in the Innisfail oil field, 50 miles north of Calgary, Alta. The plant will be an addition to a new, $4-million refinery. Cost of the addition was not disclosed. The plant will have a rated daily capacity of 10,000 bbls. of crude, 8.7 million cu.ft. of dry gas, 160 bbls. of natural gas liquids, and 80 long tons of sulfur.

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Toiletries: Colgate-Palmolive Co. has embarked on a major construction program for its Jeffersonville, Ind., plant. Included: a four-story addition to its manufacturing building, a two-story addition to its packaging and shipping center and a new two-story warehouse. Total cost: more than $1 million.

FOREIGN

Specialty Chemicals/Argentina: Heyden Newport's Nuodex Products Co. division has granted a license for production of its complete line of paint driers and several of its specialty chemicals to Nuodex Argentina, a joint venture of Heyden Newport and a group of Argentine and English businessmen.

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Carbon Black/Italy: Phillips Petroleum and ANIC, petrochemical unit of the Italian government's E.N.I. power and industrial organization, are setting up a company to build and operate a carbon black plant. Name: Phillips Carbon Black Italiana. Phillips is also building carbon black plants in France and South Africa, in each case with local companies.

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Drug Prices/Italy: The Italian government has ordered prices of all penicillin and vitamin B_{12} products slashed by 50%. The move is part of a drug price-cutting program started last March. So far, prices have been cut an average of 50-60% on 146 antibiotic products, 55 vitamin B_{12} products, 30 hormone products, and 83 sundry pharmaceuticals.

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Synthetic Fibers/West Germany: German synthetic fiber production during the first nine months of '59 increased 61.2% over the first three quarters of '58 and will probably reach 35,000 tons this year, according to a director of Farbenfabriken Bayer. Polyamide fibers accounted for only 56% of fiber output so far this year, compared with 70% last year, while acrylic and polyester fibers' share almost tripled.

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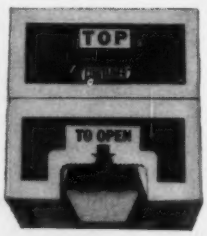

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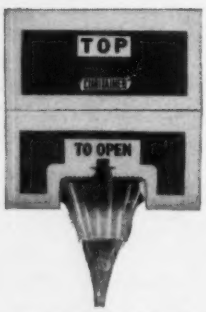

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Washington
Newsletter

CHEMICAL WEEK
November 21, 1959

Russia plans a tremendous expansion of its chemical industries. This is a solid conclusion from the most intensive public study ever made of the Russian economic machine—the study by Rep. Richard Bolling's Joint Economic Subcommittee.

The Soviet Union plans to invest 105 billion rubles in its chemical industry over the next dozen years. This is $26 billion at the official rate; $4 billion at the black market rate. Using the official rate, this would be twice what the U.S. chemical industry is currently investing.

The subcommittee heard from three dozen top U.S. experts. They agree that the Soviet ability to mount an international trade offensive is generally overrated, except for petroleum products and a few other key items. They agree that if growth is heavily concentrated in military items during the '60s, the U.S.S.R. would continue to outpace the U.S. But the Soviet economy is faced with critical problems as it tries to diversify from its basic industry effort. Any chance that the Soviets could overtake the U.S. in total output was flatly ruled out for the foreseeable future.

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In preparation for the coming drug price investigation by the Kefauver Antitrust Subcommittee, the Pharmaceutical Manufacturers Assn. has hired Hill & Knowlton, public relations firm. The agency is expected to handle PMA on a continuing basis. PMA has also hired its own staff director of public relations, William Kloepfer, Jr. Kloepfer, most recently with the Civil Aeronautics Board, was formerly on the public relations staff of the Republican National Committee.

The drug price probe opens on Capitol Hill Dec. 7. Industry representatives are disturbed that the committee has not given notice whom it will call to testify. They say that John Blair, the chief investigator, promised in September that witnesses would get at least a month's notice. So far, Austin Smith, president of PMA, is the only industry witness scheduled to be heard.

The committee has been compiling data from Food & Drug Administration files on all legal actions and correspondence with drug firms. FDA declined to attempt to supply any information on production costs, however.

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Still another report on rising medical costs—this time from the Senate-House Joint Economic Committee. A study submitted by Markley Roberts of American University finds medical care becoming "wonderfully effective and appallingly expensive." It concentrates largely on hospitals charges, does not discuss drug prices. Roberts estimates that medical

expenses have more than doubled since '50, now constitute 5% of gross national product. Needs are expanding faster than supply of services.

•

Some small drug makers selling amphetamines to bootleg outlets have been investigated by FDA in its current crackdown. Commissioner George Larrick says more of the stay-awake pills are going into bootleg channels than are legitimately distributed by prescription.

None of the big-name drug firms are involved, but some smaller, well-established makers are, says Larrick. FDA will recommend legislation requiring manufacturers, wholesalers and retailers to be registered for amphetamine production, and to keep records. This kind of registration may also be requested of barbiturate makers.

Some drug makers may be prosecuted. FDA has already arrested several wholesale peddlers and is now going after truck stop operators. It was a "revelation" to FDA that truckers are getting the pep pills largely through bootleggers, not from drug stores.

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The Federal Trade Commission is out to promote compliance with equitable trade practices. That's the meaning behind appointment of an FTC "Robinson-Patman task force."

Trade practice rules, like those covering the cosmetics industry, already try to get voluntary compliance. Publication of further rules on granting discounts, promotional allowances, etc., will be expanded in an educational effort. FTC Chairman Earl Kintner thinks he can get wider acceptance of R-P's requirements if businessmen understand them better.

None of this suggests any letup in prosecution of formal cases charging violation of Robinson-Patman provisions.

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The antidumping law regulations have been challenged by the U.S. Court of Customs & Patent Appeals. Under a complex set of ground rules, the Treasury Dept. is charged with determining, first, whether specific imports are actually being "dumped" at less than fair value, after which the Tariff Commission determines injury to domestic competition, and finally Treasury sets punitive dumping duties.

Treasury's procedures for determining dumping have been criticized frequently for years by both domestic manufacturers seeking dumping protection and importers opposing higher tariff rates.

Last week, the Customs Court threw out a Treasury finding of dumping—involving the pricing structure of Swedish hardboard imports—on the grounds that Treasury's closed-door procedures for determining dumping do not follow the 1956 Administrative Procedures Act, which sets down guide rules for executive hearings.

The Treasury maintains that its investigations under the antidumping law are not subject to that law, and will appeal the case to higher courts.

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Throughout the chemical process industry, Reynolds Aluminum lowers installation and maintenance costs, serves longer.

Wherever excessive corrosion, weight, maintenance and installation costs are factors, aluminum can probably do a better job at lower cost than any other metal.

A big statement, but there's plenty of proof in chemical processing plants, petroleum refineries, and oil fields all over the world. For example, aluminum needs no coatings to protect it from many corrosive atmospheres, liquids or gases. It keeps its strength and brightness even when handling materials that severely affect other metals. It is low in first cost and is one of the easiest materials to fabricate.

Because aluminum is light (one-third the weight of steel) it cuts handling and erection costs. And it's ideal for storage tanks and vessels that handle volatile fluids because it's (a) non-sparking, and (b) highly reflective.

For detailed information on specific properties or applications of cost-reducing aluminum for process installations, call on the people who know this metal best, Reynolds. Contact your local branch office, or write *Reynolds Metals Company, P.O. Box 2346-CM, Richmond 18, Va.*

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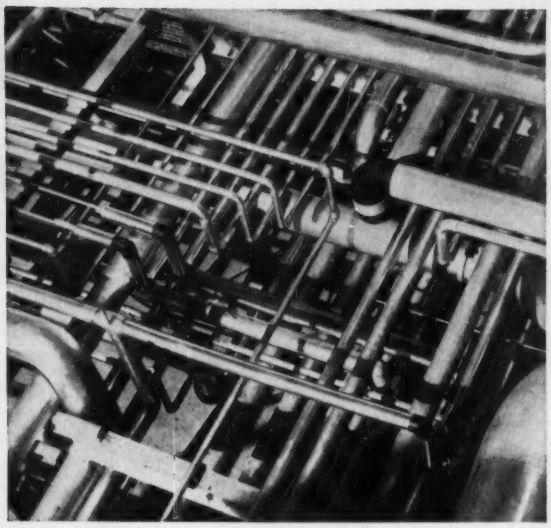
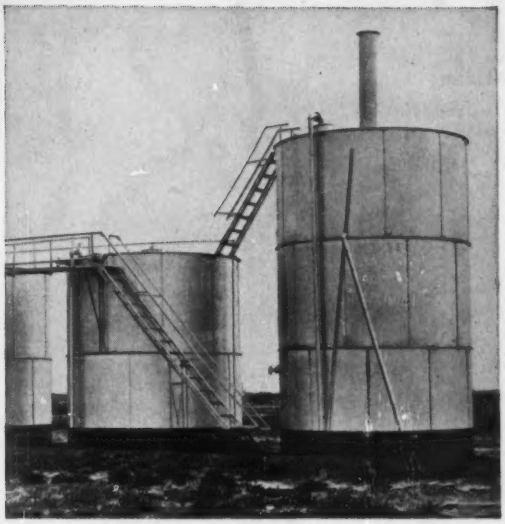
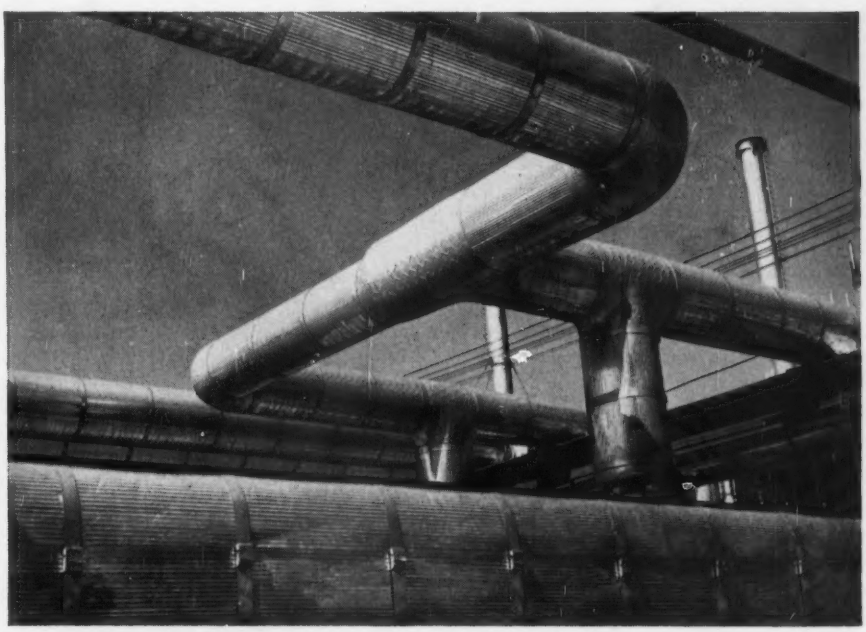
Reynolds Aluminum is a "natural" for lightweight, corrosion-resistant heat exchangers. It costs less than many other metals, has excellent heat transfer characteristics, resists fouling.



Reynolds Aluminum Process Pipe is easy and economical to install and requires minimum maintenance. It is widely used to handle corrosives like hydrogen peroxide, nitrogen solutions, refined products and many other corrosive fluids.



Aluminum Tanks and Vessels require less maintenance, do a better job of protecting volatiles from heat. Aluminum resists corrosion, won't rust—and it reflects radiant heat.



Corrosion-resistant aluminum—ideal for jacketing. Non-sparking and highly reflective, it keeps volatiles cooler, safer, conserves heat . . . protects bulk insulation.

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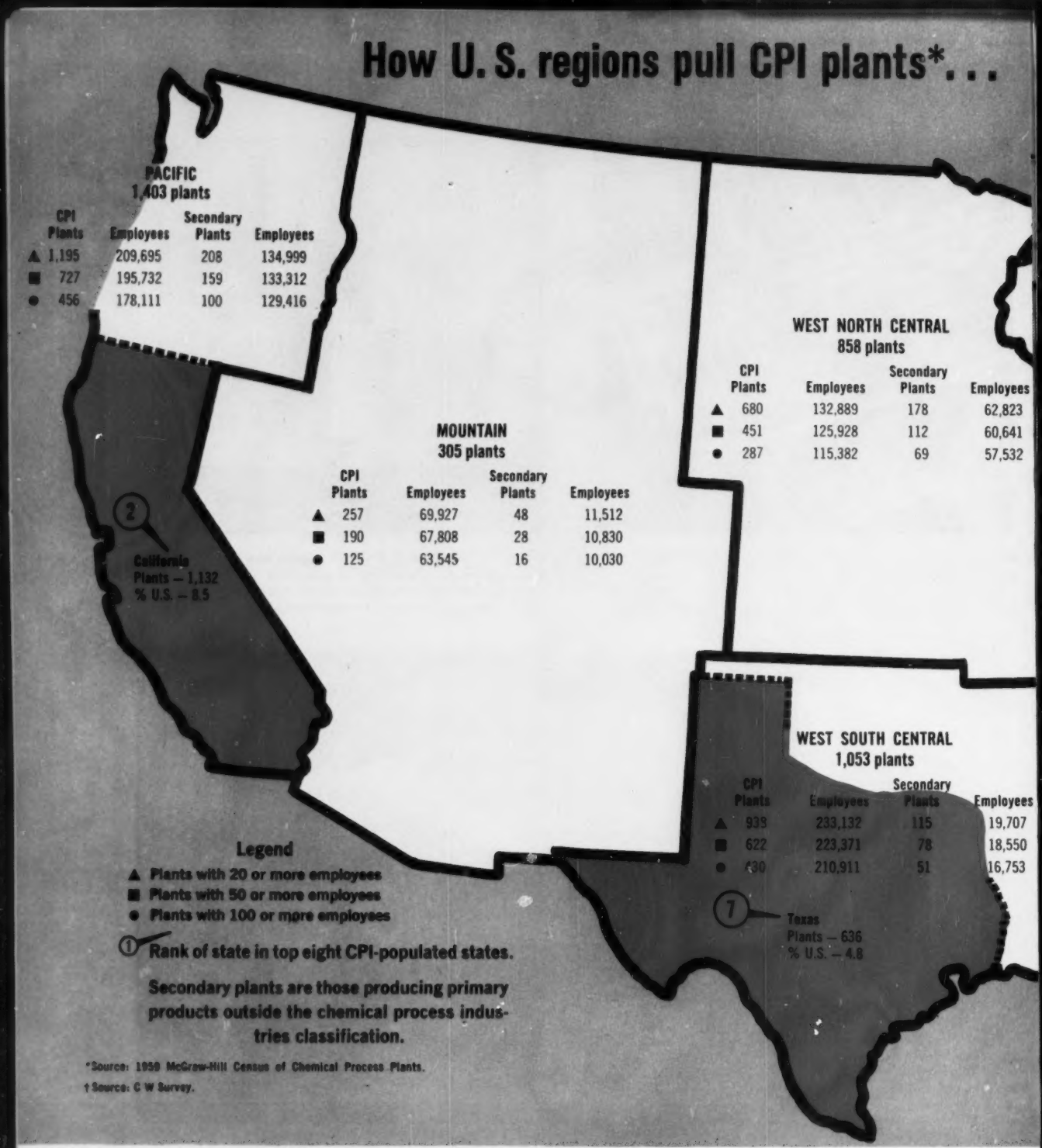


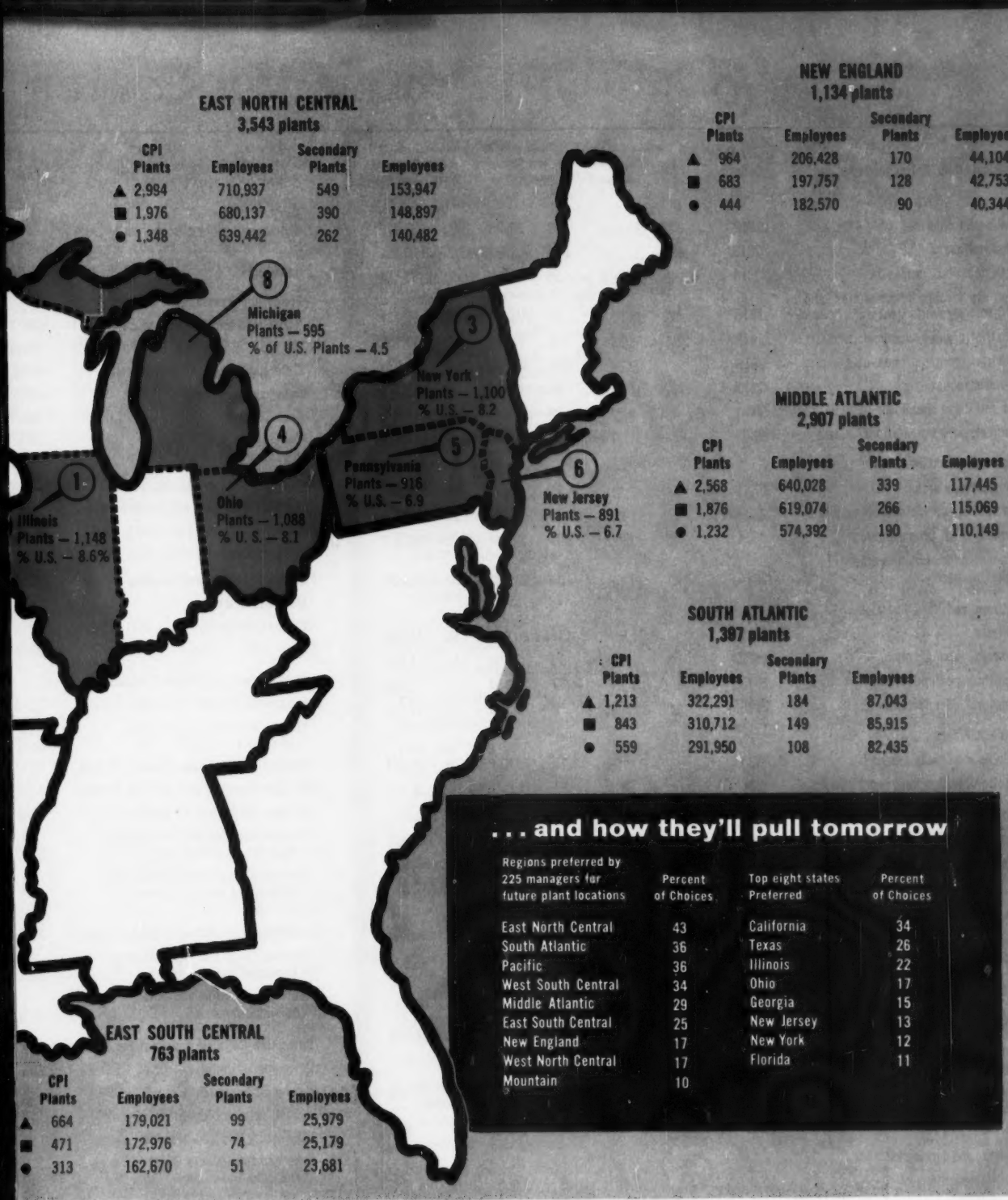
CPI's Plant Site Pattern Changes as

CPI management is looking to new areas for future plant sites, a *CW* survey shows this week. Although the East North Central region of the U.S. still leads the list as the most preferred area, new patterns of location preference are emerging.

Data* for the comparison comes from a census of chemical process industries' plant locations and from answers to questionnaires on regional preferences by 225 CPI managers.

* Full data are available (free) from Chemical Week Promotion Dept., 330 West 42nd St., New York 36, N. Y.

The census shows that the East North Central region (Ohio, Indiana, Illinois, Michigan and Wisconsin) now has 3,543 CPI plants, while the second-place Middle Atlantic region has 2,907. Other regions, in order of existing CPI plant population: Pacific,



. . . and how they'll pull tomorrow

Regions preferred by 225 managers for future plant locations	Percent of Choices	Top eight states Preferred	Percent of Choices
East North Central	43	California	34
South Atlantic	36	Texas	26
Pacific	36	Illinois	22
West South Central	34	Ohio	17
Middle Atlantic	29	Georgia	15
East South Central	25	New Jersey	13
New England	17	New York	12
West North Central	17	Florida	11
Mountain	10		

Management Turns South and West

South Atlantic, New England, West South Central, West North Central, East South Central and Mountain.

But, by comparison, managers responding to the survey indicate that their regional preferences for locating future plants are changing considerably. First choice is still East North Central, but the Middle Atlantic region has dropped to fifth on the preference list, while the South Atlantic area has risen to second place. Order of preference now: East North Central, South Atlantic, Pacific, West South Central, Middle Atlantic, East South Central, New England, West North Central and Mountain.

Illinois Leads: Existing plant population figures show that, at the state level, Illinois holds the top position, with 1,148 plants, about 8.6% of the

CPI Production Comes

Chemicals and Petrochemicals	S.I.C. Code**	Plants with 20 or More Employees: Plants	Plants with 20 or More Employees: Employees	Plants with 50 or More Employees: Plants	Plants with 50 or More Employees: Employees	Plants with 100 or More Employees: Plants	Plants with 100 or More Employees: Employees
Alkalis and chlorine	2812	46	30,581	42	30,480	35	29,970
Industrial gases	2813	181	12,314	56	8,604	23	6,552
Cyclic (coal-tar) crudes	2814	40	4,812	25	4,351	13	3,591
Dyes, dye (cyclic) intermediates, and organic pigments (lakes and toners)	2815	69	16,222	51	15,648	33	14,414
Industrial organic chemicals, n.e.c.†	2818	174	55,235	120	53,503	79	50,756
Industrial inorganic chemicals, n.e.c.	2819	333	98,221	245	95,593	171	88,135
Synthetic rubber	2822	35	16,728	32	16,623	28	16,344
Gum and wood chemicals	2861	45	8,325	34	8,040	23	7,375
Chemicals and preparations, n.e.c.	2899	279	31,178	137	26,907	82	23,271
Drugs and Medicines							
Biological products	2831	34	7,137	25	6,884	16	6,289
Medicinal chemicals and botanicals	2833	44	17,247	30	16,842	21	16,274
Pharmaceutical preparations	2834	325	72,023	207	68,508	123	63,327
Perfumes, cosmetics and other toilet preparations	2844	162	25,806	104	24,030	67	21,622
Fertilizers and 'Ag.' Chemicals							
Fertilizers	2871	309	24,580	157	20,039	66	14,364
Fertilizers, mixing only	2872	76	4,479	30	2,804	10	1,550
Agricultural pesticides	2873	86	5,500	37	4,114	18	2,916
Agricultural chemicals, n.e.c.	2879	24	12,038	13	11,750	5	11,260
Man-Made Fibers							
Cellulosic man-made fibers	2823	21	29,685	19	29,614	19	29,614
Synthetic organic fibers	2824	14	11,664	13	11,639	11	11,539
Paints, Varnishes, Pigments							
Inorganic pigments	2816	50	10,651	38	10,253	23	9,220
Paints, varnishes, lacquers, enamels	2851	566	56,367	325	49,151	164	38,887
Putty, calking compounds	2852	27	1,124	8	605	2	220
Plastic Materials							
Plastics materials, synthetic resins, and nonvulcanizable elastomers	2821	215	71,335	162	69,670	102	65,824
Soap and Related Products							
Soap and other detergents, except specialty cleaners	2841	138	26,040	82	24,425	52	22,598
Specialty cleaning, polishing and sanitation preparations, except soap and detergents	2842	212	15,669	92	12,233	41	8,908
Surface-active agents, finishing agents, sulfonated oils	2843	35	2,118	13	1,524	5	974
Explosives and Fireworks							
Artillery ammunition	1921	8	2,000	5	1,905	5	1,905
Ammunition, n.e.c.	1929	17	40,174	16	40,140	15	40,090
Small arms ammunition	1961	5	2,910	3	2,850	3	2,850
Ordnance and accessories, n.e.c.	1999	17	8,800	15	8,740	10	8,403
Explosives	2892	54	17,021	51	16,937	38	16,040
Fats and Oils							
Cottonseed oil mills	2091	191	14,801	113	12,182	29	6,790
Soybean oil mills	2092	70	6,142	42	5,169	15	3,402
Vegetable oil mills, except cottonseed and soybean	2093	45	4,795	28	4,249	17	3,481
Grease and tallow	2094	112	7,107	55	5,343	19	3,112
Animal and marine fats and oils, except grease and tallow	2095	23	3,543	14	3,300	8	2,900

	S.I.C. Code*
Shortening, table oils, margarine and other edible fats and oils, n.e.c.	2096
Fatty acids	2894
Foods and Beverages	
Condensed and evaporated milk	2023
Wet corn milling	2046
Cane sugar, except refining only	2061
Cane sugar refining	2062
Beet sugar	2063
Malt liquors	2082
Malt	2083
Wines, brandy and brandy spirits	2084
Distilled, rectified and blended liquors	2085
Flavoring extracts and syrups, n.e.c.	2087
Food preparations, n.e.c.	2099
Leather Tanning and Finishing	3111
Lime and Cement	
Cement, hydraulic	3241
Lime	3274
Metallurgical and Metal Products	
Electrometallurgical products	3313
Primary smelting and refining of copper	3331
Primary smelting and refining of lead	3332
Primary smelting and refining of zinc	3333
Primary production of aluminum	3334
Primary smelting and refining of nonferrous metals, n.e.c.	3339
Secondary smelting, refining and alloying of nonferrous metals and alloys	3341
Enameled iron and metal sanitary ware	3431
Electroplating, plating, polishing, anodizing and coloring	3471
Coating, engraving and allied services, n.e.c.	3479
Petroleum Refining and Coal Products	
Petroleum refining	2911
Paving mixtures and blocks	2951
Asphalt felts and coatings	2952
Lubricating oils and greases	2992
Coke and by-products: blast furnaces and coke ovens only	3312 (part of
Rubber Products	
Tires and inner tubes	3011
Rubber footwear	3021
Reclaimed rubber	3031
Fabricated rubber products, n.e.c.	3069
Stone, Clay, Glass and Ceramics	
Flat glass	3211
Glass containers	3221
Pressed and blown glass and glassware, n.e.c.	3229
Brick and structural clay tile	3251
Ceramic wall and floor tile	3253

***Source: 1959 McGraw-Hill Census of Chemical Process Plants; Total includes 1,809 secondary plants not listed above**

from More than 14,000 Plants*

Plants with 20 or More Employees		Plants with 50 or More Employees		Plants with 100 or More Employees	
Plants	Employees	Plants	Employees	Plants	Employees
50	8,641	41	8,370	25	7,317
12	1,822	10	1,757	7	1,574
192	14,270	117	11,892	41	6,833
41	15,899	28	15,491	19	14,898
67	15,091	63	14,994	52	14,197
19	11,790	18	11,760	16	11,635
49	10,595	49	10,595	37	9,797
203	74,916	170	73,830	135	71,397
48	5,651	33	5,202	12	3,849
78	4,824	40	3,692	16	2,167
102	26,450	73	25,482	53	24,167
97	7,211	44	5,599	19	3,944
540	49,144	290	41,657	148	32,429
227	34,831	179	33,234	114	28,764
161	40,753	158	40,673	146	39,740
58	6,073	40	5,508	22	4,236
30	16,883	26	16,739	24	16,557
34	22,730	28	22,512	24	22,277
17	9,937	15	9,872	11	9,581
25	10,299	21	10,204	18	9,989
20	23,967	18	23,918	17	23,838
54	29,230	45	28,960	34	28,178
63	5,728	37	4,915	19	3,800
95	15,858	67	15,053	46	13,689
379	20,266	155	13,581	47	6,637
153	10,099	73	7,816	34	5,392
302	148,521	242	146,642	197	143,816
106	9,067	66	7,797	39	6,133
101	14,461	80	13,819	52	11,986
105	8,315	48	6,723	25	5,285
54	133,142	53	133,122	52	133,048
81	103,493	65	102,995	56	102,475
30	21,054	28	20,969	27	20,904
16	3,335	14	3,280	8	2,910
679	138,417	452	131,464	298	121,755
55	40,138	44	39,786	35	39,255
86	55,612	85	55,589	82	55,336
138	44,888	113	44,150	87	42,360
459	31,042	250	23,786	72	11,665
40	11,212	32	10,924	26	10,436

	S.I.C. Code**	Plants with 20 or More Employees		Plants with 50 or More Employees		Plants with 100 or More Employees	
		Plants	Employees	Plants	Employees	Plants	Employees
Clay refractories	3255	140	18,767	119	18,143	69	14,797
Structural clay products, n.e.c.	3259††	65	4,387	32	3,247	12	1,878
Vitreous china plumbing fixtures and china and earthenware fittings and bathroom accessories	3261††	33	9,172	33	9,172	27	8,689
Vitreous china table and kitchen articles	3262††	29	8,653	24	8,500	20	8,266
Fine earthenware (whiteware) table and kitchen articles	3263††	36	13,250	33	13,173	28	12,866
Porcelain electrical supplies	3264††	37	9,454	31	9,251	26	8,875
Pottery products, n.e.c.	3269††	111	7,235	52	5,419	17	2,992
Gypsum products	3275††	56	10,840	47	10,534	41	10,054
Abrasive products	3291	126	30,716	73	29,124	49	27,637
Asbestos products	3292††	84	21,764	70	21,308	60	20,574
Steam and other packing, and pipe and boiler covering	3293††	87	11,757	41	10,209	23	8,903
Minerals and earth, ground or otherwise treated	3295	171	16,165	95	13,745	57	11,154
Mineral wool	3296††	56	9,956	39	9,313	20	7,898
Nonclay refractories	3297	53	7,054	41	6,647	29	5,888
Nonmetallic mineral products, n.e.c.	3299††	38	3,826	20	3,301	10	2,547
Wood, Pulp, Paper and Board							
Wood preserving	2491*	158	11,139	92	9,044	33	4,924
Pulp mills	2611	56	37,475	49	37,222	44	36,912
Paper mills, except building paper mills	2621	280	142,677	262	142,054	229	139,660
Paperboard mills	2631	151	41,807	136	41,222	114	39,778
Paper coating and glazing	2641	133	29,468	107	28,601	73	26,365
Building paper and building board mills	2661	83	28,733	70	28,303	51	27,054
Other Products							
Part of broad woven fabric mills, wools: including dyeing and finishing	2231	31	7,765	29	7,694	21	7,200
Finishers of broad woven fabrics of cotton	2261	210	56,211	164	54,761	117	51,789
Finishers of broad woven fabrics of man-made fiber and silk	2262	72	10,792	57	10,304	34	8,697
Dyeing and finishing textiles, n.e.c.	2269	147	21,857	117	20,935	64	17,488
Artificial leather, oilcloth, and other impregnated and coated fabrics except rubberized	2295	58	10,797	44	10,340	33	9,636
Carbon and graphite products	3624	26	7,785	21	7,624	19	7,499
Storage batteries	3691	110	16,024	80	15,132	43	12,648
Primary batteries (dry and wet)	3692	23	7,072	20	6,970	18	6,851
Photographic equipment and supplies, SIC part 2 only	3861	50	36,662	42	36,424	30	35,634
Lead pencils, crayons and artists' materials	3952	47	5,477	33	5,110	19	4,235
Carbon paper and inked ribbons	3955	56	5,608	31	4,858	18	4,063
Linoleum, asphalted-felt-base, and other hard surface floor coverings, n.e.c.	3982	15	7,237	12	7,137	12	7,137
Matches	3983	21	6,329	19	6,265	15	6,030
Candles	3984	24	2,069	16	1,829	8	1,285
Printing ink	2893	82	6,637	45	5,546	18	3,758
Carbon black	2895	38	3,670	26	3,221	14	2,494
Glue and gelatin	2891	78	6,343	42	5,231	22	3,889

**Standard Industry Classification (Dept. of Commerce); †Not elsewhere classified; ††Figures taken from 1954 U.S. Census of Manufactures

engineering the future

Whether you have materials handling problems or any other process needs—Vitro engineers know how to help. These technical men have the background and ability gained by solving the hard-to-do-problems, as well as the routine.

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U.S. total. California ranks second, with 1,132, and New York third, with 1,100.

Others of the top eight states that have CPI plants are Ohio, Pennsylvania, New Jersey, Texas and Michigan, in that order.

When it comes to naming eight specific states in which they would prefer to put their plants, however, the managers queried in the survey have drastically different views. Top choice is California. Texas is second in preference, trailed by Illinois, Ohio, Georgia, New Jersey, New York and Florida, in that order.

Total number of primary and secondary chemical processing plants, according to the census, is 14,109 (of which 1,890 are secondary plants). The total differs from that obtained by adding regional figures (13,363 plants, including secondary producers). Reason: the regional total excludes data on eight Standard Industrial Classification categories. These data could not be interpolated into regional figures.

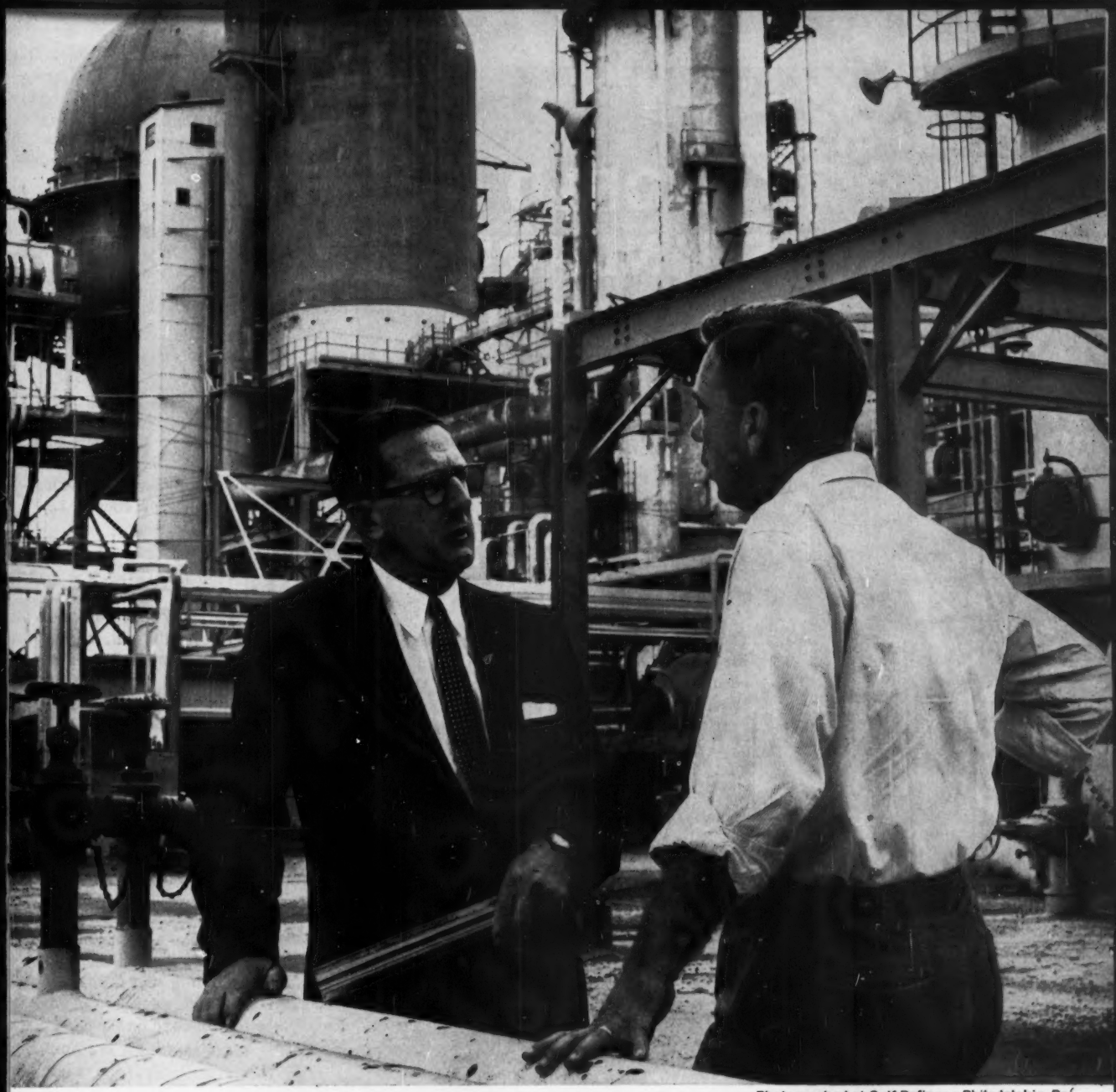
Cranberry Crisis

Caught at the snapping end of a publicity whiplash last week, American Cyanamid found itself jerked onto the front pages of newspapers coast to coast as the major producer of aminotriazole, the contaminant in the cranberry crisis. The situation called for quick mobilization to head off further bad publicity.

Although Cyanamid was blameless—its packages are marked plainly that the herbicide is to be used on the fields only after the berries have been harvested—it nevertheless found itself involved in the cancer-scare controversy between the Food & Drug Administration and cranberry producers and canners.

After hurried conferences, Cyanamid's public relations department and sales management organized a flying squad of public relations, technical and medical men armed with the "facts of the matter," as Cyanamid knew them. This group was prepared to give information as fully as possible to anyone interested. Most questions revolved around technical terms, as newspapers sought clarification for their readers.

Within hours, Cyanamid drafted a statement concurring with, and standing by, that of the National Agricul-



Photographed at Gulf Refinery, Philadelphia, Pa.

How cooperation helped develop a new economy catalyst

Cooperation with refiners at all levels in helping them meet the demand for ever-improved fuels is a guiding principle by which Cyanamid works. This philosophy has aided in the development of many highly efficient catalysts, most recent of which is low-cost Aerocat® 2000 fluid silica alumina cracking catalyst.

Aerocat 2000, compared to natural MS catalysts, offers improved activity stability, higher octane production, superior attrition resistance, more uniform physical properties, and lower coke production.

Cyanamid's sales representatives are prepared to apply the Golden Rule to your problems through the helpful cooperation you want. They are well equipped to be of valuable assistance because of their knowledge and experience in catalytic chemistry, which is backed by a competent organization–a catalyst producer who is also a major chemical manufacturer. Call on your Cyanamid salesman–the man with the Golden Rule.

Basic in catalyst chemistry

CYANAMID

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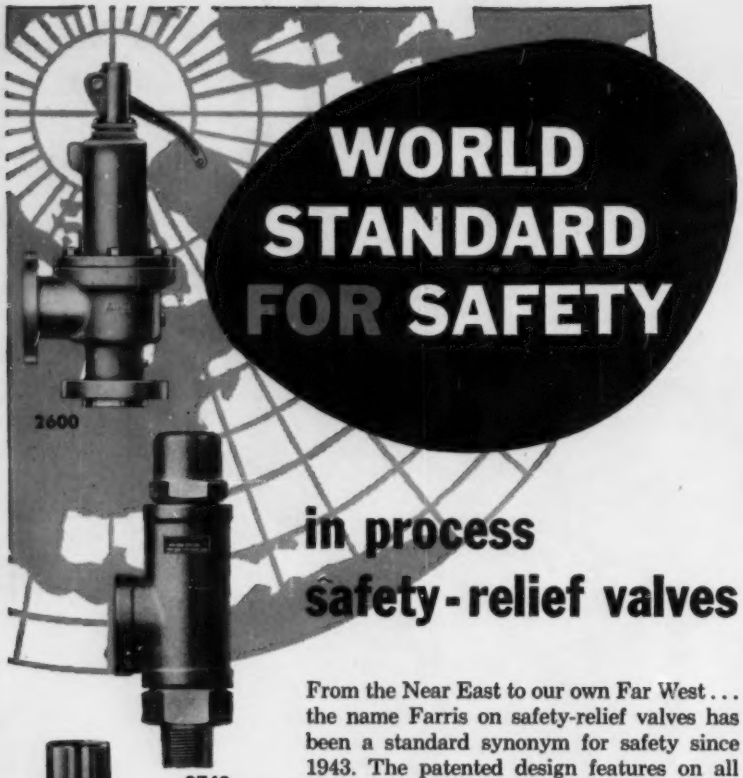


From the Near East to our own Far West . . . the name Farris on safety-relief valves has been a standard synonym for safety since 1943. The patented design features on all Farris full-nozzle valves combine to offer the ideal concept of a trouble-free, 100% safe safety-relief valve for every application.

2745

SERIES 2600

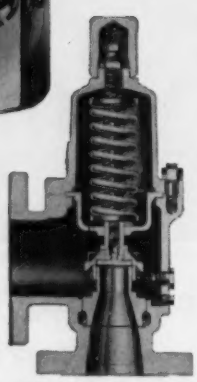
The most popular top-guided, self-aligning, safety-relief valve for process piping service. Maximum pressure, 150 to 2500 psig, RF/RJ. Plain or Lever types. Standard or BalanSeal bellows construction.

SERIES 2740

A cast-steel relief valve of simplified design for use where extreme blow down accuracy is not essential, but where durability, compactness are. Pressures to 3500 psig at 450°F; 2000 psig at 800°F. Sizes ½" to 2".

SERIES 2745

An extremely rugged, compact, high pressure bar stock nozzle valve. Internal parts stainless steel. Adjustable blow down; flat seat; self-aligning stem and disc. Pressure to 10,000 psig. Sizes ½", ¾", 1".


2950

SERIES 2950

A cast iron safety-relief valve including most of the exclusive Farris features found in the Series 2600. Max. pressure, 250 psig at 450°F, 400 psig at 150°F. Plain cap, open lever or packed lever types.

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tural Chemicals Assn., which underscored the high intake of aminotriazole fed to rats in cancer experiments and how large would be the herbicide quantities needed to provide the same intake for human beings.

Two days after the storm broke, Cyanamid placed top technical management on an early morning television show, Dave Garroway's "Today." There, the company was able to make the same points, establish its position.

Cyanamid feels that prompt mobilization of publicity forces helped allay the public's fears. How sales of herbicides generally will fare in the future, as consumers link cancer with the chemicals, won't, of course, be determined for some time.

Stiffer Safety Rules?

Although last week's fire in the Houston Ship Channel is out, smoke still clouds the long-range effects it may have on chemical processors in the area. If predictions made in the heat of fire fighting come to pass, industries along the channel may be facing far stricter safety regulations. In any case, there will be a thorough survey of fire preventive and fighting equipment.

A plan of tight fire inspection along the waterfront will probably be initiated at once, according to J. P. Turner, general manager of the Port of Houston. "I believe a combination of greater city and industrial interest along the navigation district would be proper," Turner said. Almost coincidentally, the fire followed on the heels of requests for stepped up fire inspection.

Chemical and petroleum companies near the blazing *Amoco Virginia* sent their crews to help fight the fire. The ship was across the channel from Olin Mathieson's plant, itself next to Heyden Chemical and to Phillips Chemical. Hess terminal—where the ship was docked—is adjacent to Warren Petroleum's plant.

H. R. Cunningham, chairman of Houston Ship Channel Industries Disaster Aid — made up of virtually all industries, warehouses, chemical and refining companies on both sides of the channel — told *CW*, "Industrial fire fighters were not called upon, and no one knows how they got there, but they were on the scene."

A new manufacturing process, exclusive with Stauffer, combines a special conditioner with borax of uniform chemical composition and exceptionally white color. Mesh size has been selected to minimize dusting during formulation.

The result is a hand soap grade of borax with unique free-flowing and non-caking characteristics, unusually active in any formulation and ideally suited to the needs of the formulator of powdered hand soap.

every hand soap formulator should test this new grade of borax

Formulators using "West End" Hand Soap Borax will have no difficulty in meeting government specifications.

Send for samples of Stauffer's new "West End" Hand Soap Borax.

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Today, Naugatuck is one of the world's leading latex suppliers—your best source for latex in any form. Whatever your product requirements may be, find out *first* from Naugatuck Chemical how its natural or synthetic rubber latices, plastic resin latices, or ready-to-use latex compounds can help you plan newer, better and more salable products. Write for more detailed information.

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- dimensional stability
- permanently anchored pile
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One or several of Naugatuck's LOTOLS® (made-to-order latex compounds) can help you increase the salability of your textiles and carpeting. Naugatuck's LOTOLS offer your products new and improved properties at low cost—properties that keep you a step ahead of your competition. Whether you buy a LOTOL compound or raw latex to compound yourself, find out first how you can profit with Naugatuck products. Write or call our nearest Naugatuck district office.

US RUBBER **United States Rubber**

NAUGATUCK CHEMICAL DIVISION

ADMINISTRATION

LABOR

Paper Pact: A strike by members of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers was ended at Bowaters Carolina Corp.'s Catawba, S.C., plant with ratification of the company's latest contract proposal. Although terms of the contract have not been revealed, they reportedly resolve a union demand that craft classifications be retained among maintenance employees.

•

Wage Boost: Intermountain Chemical Co. and Local-13-214 of the United Mine Workers, District 50, have signed a two-year wage agreement for Intermountain's Trona plant at Westvaco, Wyo. The pact calls for a 12¢/hour wage boost immediately and another 8¢/hour increase in Oct. '60, improvements in fringe benefits.

•

No Shutoff: At Louisville, Ky., efforts to prevent a strike threatening to shut off acetylene production vital to other plants in the area were successful. Negotiations between National Carbide Co. and 325 members of Firemen and Oilers Local 320 resulted in a three-year pact calling for a wage hike averaging 8¢/hour this year, with wage-reopening provisions for the adtional two years.

•

Action Abroad: The British Assn. of Chemical and Allied Employers has offered to reduce the work week of 70,000 workers from 44 hours to 42, without pay loss. The offer follows a separate agreement made last week between Imperial Chemical Industries Ltd. and the unions for a 42-hour week affecting 60,000 ICI workers.

Latest offer by employers affects production workers in 400 companies producing plastics, fertilizers and heavy chemicals.

LEGAL

Aspirin Headache: Loblaw, Inc., Northeastern supermarket chain, has filed a suit in New York supreme court seeking the right to sell Bayer Aspirin in its supermarkets without first getting registration certificates from the New York state board of pharmacy. Defendants in the case are the state board of pharmacy and the state board of regents. New York's board of regents contends that, under the law, aspirin must be sold only in drugstores, and that it is not a proprietary drug — which can be sold by unlicensed persons — because the patent on aspirin expired in 1917 and it may now be manufactured by anyone. Loblaw argues that Bayer Aspirin is a proprietary drug because its manufacturing process utilizes a number of important trade secrets "in the interest of purity and stability."

•

Pep Pills: No big-name drug firms, but some smaller, well-established drug manufacturers may soon be prosecuted by the Food & Drug Administration for selling amphetamine to "bootleggers." FDA Commissioner George Larrick says more of the "pep" pills are going into illegal channels than into legitimate distribution by prescription.

The tablets find their way mainly to truck drivers. FDA has already arrested several wholesale peddlers in a current cleanup drive. Recommended legislation in the offing would: (1) require manufacturers, wholesalers and retailers to be registered for amphetamine production and to keep records; (2) declare illegal sale of the pills a "burden" in interstate commerce, so that crossing a state line need not be proved in each bootleg sale.

•

Rubber Suit: The Rubber Manufacturers Assn. and 10 of its members—including three of the country's largest—were fined a total of $177,500 for violating the Sherman Antitrust Act. After strong resistance by the Justice Dept., the judge permitted the defendants to plead *nolo contendere* (no contest) to the criminal indictment of conspiracy in unreasonable restraint of trade to fix prices in the flat-belting industry.

Justice Dept. attorney David Harris said, "The agreement entered into blanketed the whole market. There was no manufacturer making these items outside of the members of the association." The conspiracy allegedly existed between '49 and '57, covering the period of the Korean War, when the defendants increased their prices five times in anticipation of a shortage and government controls, according to government testimony.

•

'Liver' Pills: Carter Products, Inc., maker of Carter's Little Liver Pills has

Announcing

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MAGNESIUM SILICATE

New plant now producing highly adsorptive free-flowing powder

AICCO-SOL is a synthetic form of magnesium silicate with remarkable adsorptive powers, capable of de-odorizing and de-coloring liquids, and preventing caking of powders. It is a fine, white, free-flowing powder with porous structure and high surface-to-volume ratio.

AICCO-SOL is selective in its adsorptive powers, with strong affinity for acidic and polar materials, moisture vapor, gases, and color and odor-forming compounds.

Made in AICCO's new plant . . . an outgrowth of American Industrial Chemical Company's experience as a producer of silica gel, hydro gel, and other silicates. Samples and technical assistance gladly offered.

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- Controlling thixotropy of plastic coatings
- Chromatographic adsorption in antibiotic and vitamin manufacture
- Retaining moisture, perfumes and flavors in powdered products.
- Preventing caking in plastic molding compounds, fertilizers, detergents, tooth powder, feed supplements, etc.
- Catalyst and catalyst carrier

PROPERTIES OF AICCO-SOL

Density, gm./cc.	2.04
Specific Area	600 sq.m./g.
Refractive Index	1.500-1.515
Pores: Volume	630 ml./g.
Avg. Dia.	33 A°
Distribution	Uniform
pH of 10% slurry	7.5-8.5

Reactions: Water adsorbed; no change in volume.
Weak acids removed by adsorption.
Strong acids dissolve it.
In salts, heavy metal ions displaced.
In bases, no reaction.

Write for data and samples

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ADMINISTRATION

lost out on its petition for a Supreme Court review of an order barring all advertising in which the word "liver" appears in the tradename of its product. The order also bars Carter from advertising that its product "increases bile flow," but does not bar claims concerning cathartic properties of the pills.

KEY CHANGES

Richard C. Cole to vice-president, manufacturing, **Paul R. Kruesi** to vice-president, research and development, **Malcolm H. McAllister** to vice-president of the company, all of Vitro Chemical Co., subsidiary of Vitro Corp. of America (New York).

Sidney C. Moody to chairman of the board of directors and **Robert C. Swain** to president of Cyanamid International Corp.; **Richard O. Roblin** to vice-president, research, commercial development, engineering and construction of the parent company, American Cyanamid Co. (New York).

August Kochs to vice-chairman, board of directors, **Rothe Weigel** to senior vice-president of the company and president and general manager of Victor Chemical Works Division; **Roger W. Gunder** to vice-president, sales, and **William Engs** to vice-president, production—both of Industrial Chemicals Division; **Raymond L. Geiler** to vice-president and general manager, A. R. Maas Chemical Division; **Morris R. Stanley** to vice-president, sales, and **Francis M. Anable** to vice-president, production — both of Victor Chemical Works Division; **Sam S. Emison** to vice-president, marketing, **Hermann P. Jockers** to vice-president, production, **Donald G. Ellis** to vice-president, Western sales, **James W. Kettle** to vice-president, finance—all of the parent company, Stauffer Chemical Co. (New York).

Howard B. Myers to vice-president, Tennessee Products & Chemical Corp., a subsidiary of Merritt-Chapman & Scott Corp. (Nashville).

DIED

William Scheutte, 47, director and vice-president, Dow Chemical Co., and general manager of Dow's Midland Division.

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We Have Taken the "Rare" out of "Rare Earths"

You Now Have a Wide Choice of Readily Available Materials

a report by LINDSAY

We were thinking the other day of the progress we have made in taking the "rare" out of "rare earths." Even the "earth" in rare earth is not completely descriptive, either.

Actually, the name rare earths does fit these elements into the periodic system, for they are earthy when in the form of oxides. In this respect, they resemble the "earth" elements, aluminum being a good example. The "rare" came from the fact that those wonderful chemists of the last century thought that they were indeed rare, since the only supplies available were derived from quite rare and exotic minerals found then in a very few pegmatitic deposits in Norway.

Now, of course, you can buy rare earths in almost any size, shape and form. You can order in grams, ounces, pounds, and in many cases in carloads!

These elements have been described by other names such as "lanthanides" and "lanthanons." Technically, these are the elements lanthanum, atomic number 57, and the next fourteen elements in the periodic system. Thus, rare earths include all the elements from atomic number 57 to 71 (lanthanum to lutetium).

Due to some remarkable similarities in properties, the rare earths tend to occur together in nature. These same properties make it difficult to separate them in some cases. From the standpoint of availability of commercial materials, there are several choices.

Rare Earth Materials. The ore mineral commonly used as a source of rare earths is monazite. Rare earths extracted without any appreciable separation are marketed commercially as "rare earth" salts or materials. They contain these elements in about the same ratios as in the ore: roughly one-half cerium, one-quarter lanthanum, one-fifth neodymium, about five per cent praseodymium, and smaller amounts of the other rare earths. Being close to the starting material, "rare earth" salts are the most economical.

THE RARE EARTHS

ATOMIC NUMBER	ELEMENT
39	Yttrium
57	Lanthanum
58	Cerium
59	Praseodymium
60	Neodymium
62	Samarium
63	Europium
64	Gadolinium
65	Terbium
66	Dysprosium
67	Holmium
68	Erbium
69	Thulium
70	Ytterbium
71	Lutetium
90	Thorium

Cerium. Cerium is the most important single rare earth, relatively easy to separate and available in a rather complete range from commercial to high purity grades.

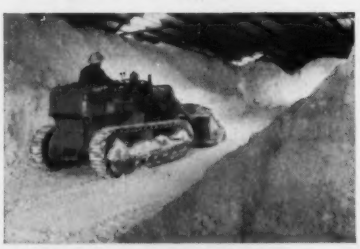
Didymium. Taking cerium out of the rare earth mixture leaves a collection of rare earths we call "didymium." Didymium materials, like cerium, are close to the starting ore, so costs aren't excessive.

High Purity Materials. *Lindsay* pioneered the first commercially installed ion exchange plant for the production of individually separated rare earths in purities up to 99.99%. These high purity materials are now readily available at prices which were unheard of only a few years ago.

Many applications. We have made remarkable progress . . . through the development of improved techniques for the separation of the rare earths, and expansion of production facilities . . . in taking the "rare" out of "rare earths." Needless to say we were compelled by considerable urgency to satisfy the rapid growth in demand by industry for many new uses.

• • •

We have prepared a revised edition of our technical data describing our rare earth, yttrium and thorium materials. Your request for the "Lindsay Binder" will bring you this collection of data promptly. If you have a specific idea or use in mind, let us know and our technical people will try to supply pertinent data.



We show you this photo of bulk handling of rare earth intermediates at our West Chicago plant to suggest that rare earth materials are produced in large tonnages. They are available for prompt shipment, some of them in carload quantities. Prices, incidentally, are surprisingly low.

PLEASE ADDRESS INQUIRIES TO

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American Potash & Chemical Corporation

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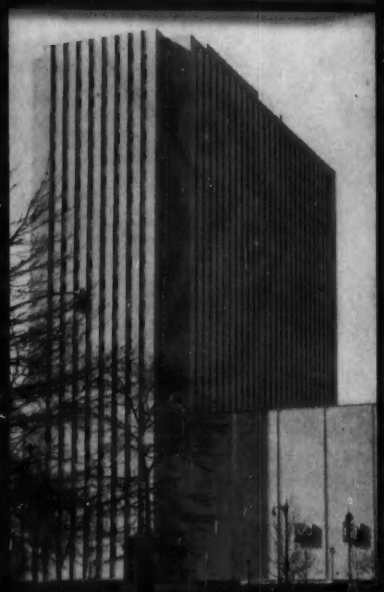
This is your special Chemshow section. Tear it out and take it with you to the show.

Who, what, where at the exposition

FINAL CHEMSHOW COVERAGE



We at KENNEDY VAN SAUN are looking forward to the Chem Show with keen anticipation, for it is always pleasant to talk to our old friends again, and to have the opportunity to meet new ones in the Chemical Industry.

This, then, is an invitation on behalf of our company and its management to stop at our booth, No.1036,at the New York Coliseum during the week of November 30th.

We believe your visit with KENNEDY will be one of your most rewarding experiences of the entire Exposition. At our booth you will see complete KENNEDY plants pictured and described; you will find interesting information about all the process equipment made by KENNEDY; you will learn about the facilities, experience and achievements of KENNEDY's Engineering and Research Departments. And, our New York Offices are but minutes away from the Coliseum. Our executives and our Engineering Staff are ready to help you with any extra service or information you need in solving your process problems. Please feel free to make arrangements at our booth.

We look forward to your visit.

Dupont Tyler

President

See our products on pages 407-411 in your 1960 Chemical Engineering Catalog.

KVS

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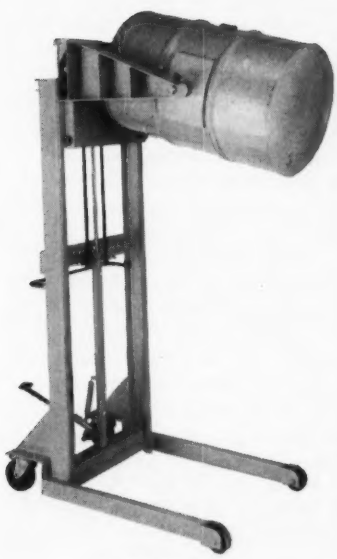
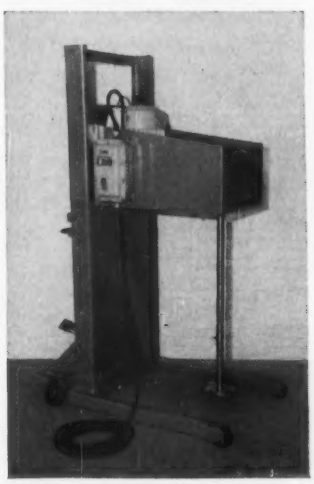
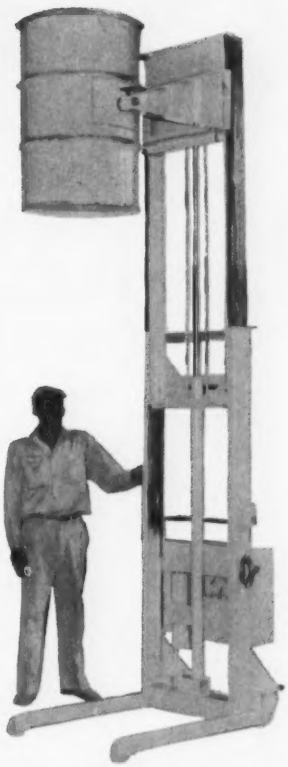
Hope to see you at the Chem Show

BOOTHS
1413-1430



#756
Manually Operated





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CW previews

The 27th Exposition of Chemical Industries

Nov. 30-Dec. 4

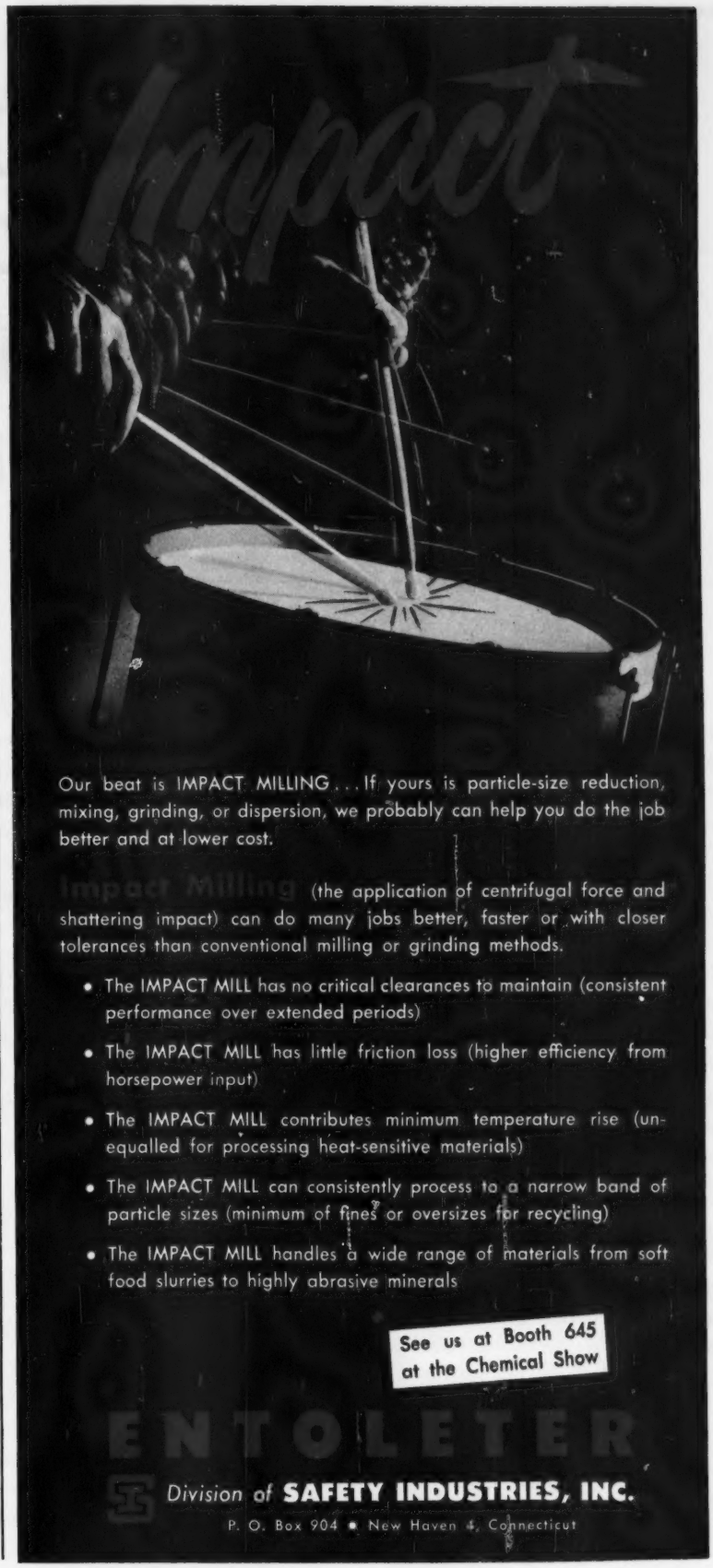
What to look for at the Chemshow — a capsule glimpse of a few of the newest products and equipment "firsts" you'll see at the exposition 70

Where to go in and around New York— some tips for out-of-towners on how to get to the coliseum, events of interest to Chemshow visitors 79

Alphabetical listing of exhibitors—the complete final listing of 550 companies participating in the Chemshow, with addresses and display-booth numbers 89

Coliseum floor plans of exhibits—a gatefold of the Chemshow layout locates every numbered display booth, shows where to find registration desks, check rooms, phones and snack bars 103

Classified listing of exhibitors—23 pages of exhibit listings by product and equipment category to help you find the items you're looking for 110



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You can meet a *wide* variety of chemical and petrochemical processing requirements efficiently and economically with NORTON Products. They're more than just outstanding refractory materials. In addition, they provide versatile combinations of chemical, physical, and electrical properties that make them valuable aids at many critical stages of production. Find out how these advanced materials from the NORTON electric furnaces can help *your* operations by substantially improving process and product . . . sharply reducing operating costs. If you wish, the NORTON Man will be happy to discuss processing problems with you at any time. Backed by years of experience in the field, he's well qualified to help. Write NORTON COMPANY, Refractories Division, 910 New Bond Street, Worcester 6, Massachusetts.

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A full line of catalyst carriers to meet the requirements of a wide range of feedstocks and thermal conditions. For coated or impregnated use. Size, weight, porosity, pore diameter, and purity held to close tolerances to assure precise duplication of results.

SHAPES	*MATERIALS*	*POROSITY*
Spheres	Alumina	from 10% to 50%
Rings	Silicon Carbide	
Pellets	Fused Magnesia	*Surface Area*
Granules	Zirconia	
Powders	Silica, Zircon	From less than 1
	Magnesia-Alumina	to 70 M^2/gram*
	Spinel, etc.	

Bulletin No. 7 gives full details. *BET Method

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A wide selection of porous media for filtration, diffusion, or aeration. Made of strong, chemically stable ALUNDUM* fused alumina, they also have high resistance to alkalies and acids. Provide uniform flow, with pores uniformly distributed in needed sizes and open-pore ratios. Tubes, plates, discs. Catalog No. 140 provides details.

FOR NUCLEAR WORK

Control and shield materials, including highly stable, lightweight NORBIDE* (B_4C). Metallurgical processing refractories. Ceramic fuel pellets. Source and intermediate materials.

FOR HIGH TEMPERATURE PROCESSING

Castables: Highly versatile, easy-to-handle ALUNDUM fused alumina materials for insulation. Provide protection up to 3300°F. Shipped dry in moisture-protective bags, they can be mixed in minutes. Small, lightweight bubbles or dense grains. Bulletin 1992 offers details.

Cements: Three different heat-resisting, chemically-inert materials carefully blended to assure proper grit-size distribution. ALUNDUM fused alumina, CRYSTOLON* silicon carbide, MAGNORITE* fused magnesia. For troweling, ramming, patching, pressing or brick-laying. Catalog 863 provides more information.

products

Ceramic Spray Coatings: Hard, crystalline materials which can be applied to a wide variety of base materials to provide thermal or electrical insulation, add mechanical strength, improve resistance to wear, corrosion, and chemical activity. ROKIDE* "A" aluminum oxide; ROKIDE "ZS" zirconium silicate; ROKIDE "Z" zirconium oxide. Bulletins available.

Fired Shapes: High-purity shapes of ALUNDUM fused alumina and fused stabilized zirconia offer excellent thermal insulation and chemical stability at high temperatures under both oxidizing and reducing atmospheres. CRYSTOLON silicon carbide products are available for processes involving heat transfer and abrasion resistance. Write for Catalog 862.

ALUNDUM ware has been used successfully for many years in laboratory development, experimental and analytical work involving filtering, extractions, melting, incineration, etc., because of its chemical resistance and stability in contact with reagents and solvents. Write for Catalog 793.

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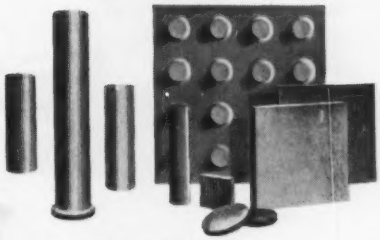
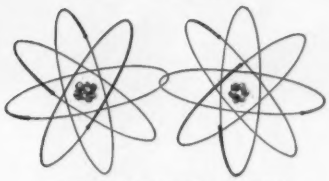
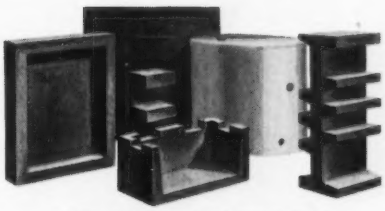


FOR FILTRATION



FOR NUCLEAR WORK



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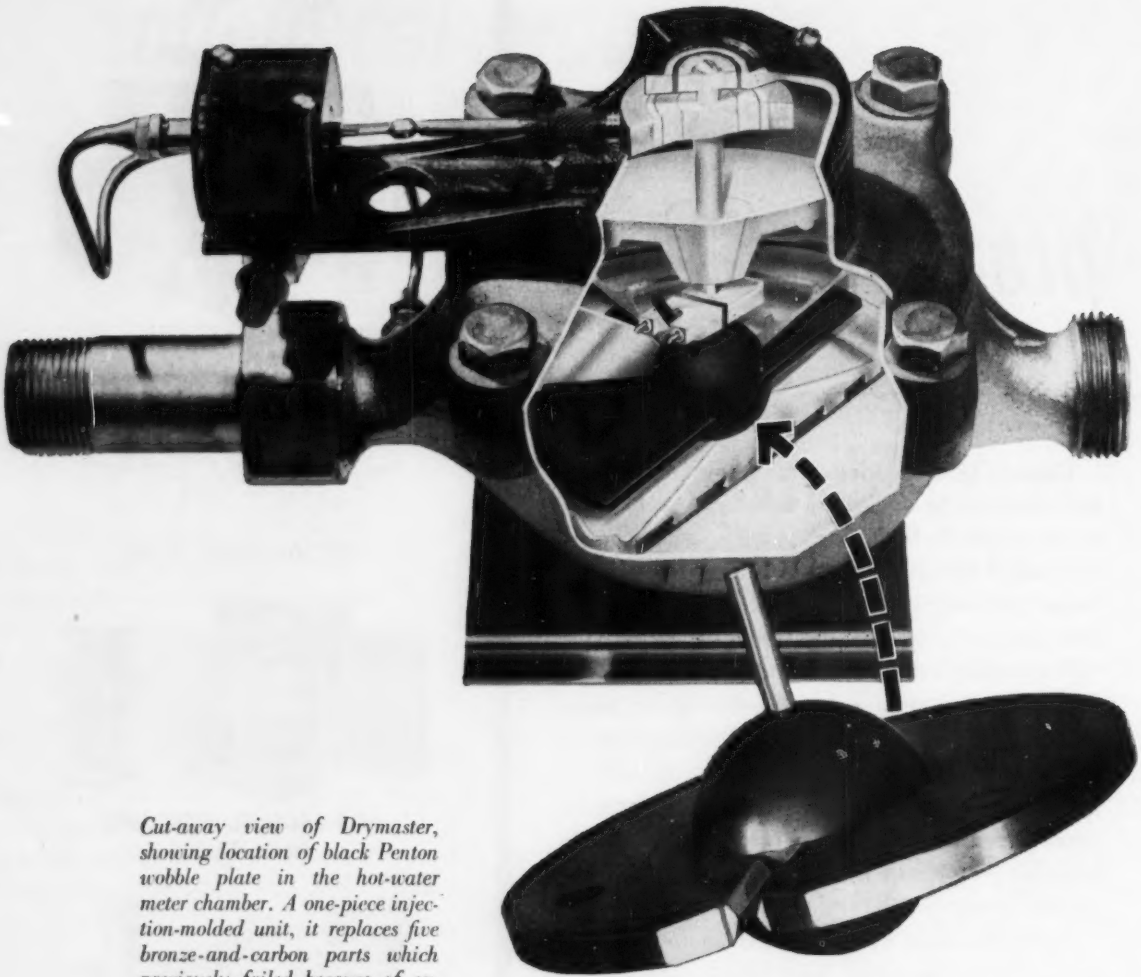
THE HEART OF THIS HOT-WATER METER



Cut-away view of Drymaster, showing location of black Penton wobble plate in the hot-water meter chamber. A one-piece injection-molded unit, it replaces five bronze-and-carbon parts which previously failed because of excessive wear.

Information regarding meters and Disc and Half-Ball Assemblies is available from the Industrial Division, Economics Laboratory, Inc., St. Paul 1, Minnesota

THE DRYMASTER STORY

*Drymaster**, a new proportionate pumping system, was developed by Economics Laboratory, Inc., to automatically dispense its nationally known line of chemical formulations for commercial dishwashing. The *Drymaster* was originally powered by a standard ⅝ in. water meter, driven by a conventional 5-piece bronze disc and carbon half-ball assembly.

Failures after only a few months of service were directly traced to wear of the disc and half-ball (see photo, opposite page). In the long search for a suitable replacement, more than 150 materials were extensively evaluated, including metals, glass, plastics, and combination products.

Penton—a tough new thermoplastic—proved the answer. It worked best, and at the same time, cost less.

**Tradename of Economics Laboratory, Inc., St. Paul, Minn.*

IS A ONE-PIECE PENTON® PART

This precision-molded unit replaces five parts... costs less yet increases service life manifold

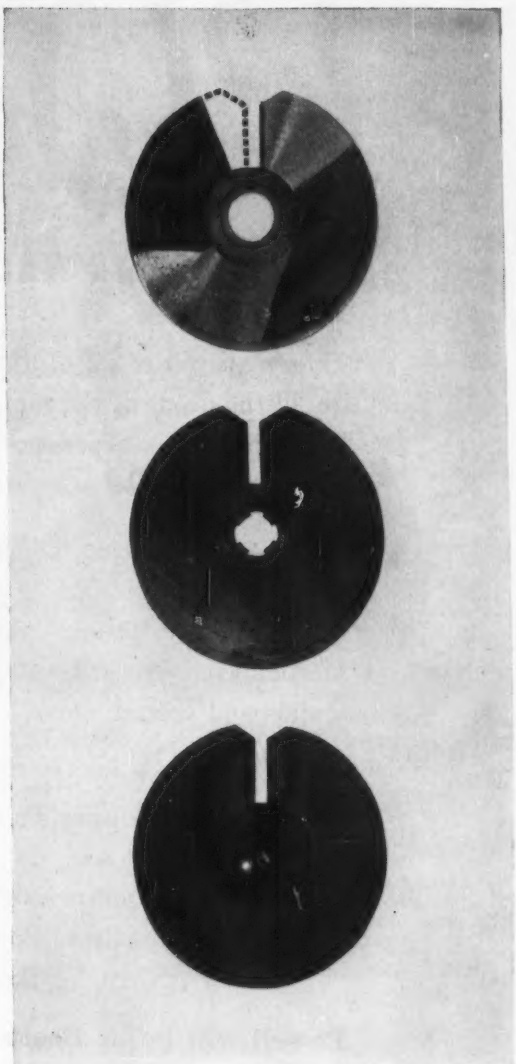
THE PENTON STORY

The success of Penton in the *Drymaster* is typical of the way this versatile new thermoplastic can be precision-molded to provide superior, low-cost replacements for expensive machined metal parts.

Although one of the newest of plastics, Penton chlorinated polyether was exhaustively tested during five years of product evaluation prior to its recent introduction as a commercial material. As a result, it already has a fine record of proven performance in a wide variety of anticorrosive uses: valves, pipe, fittings, tank linings, pump and meter parts.

Penton's outstanding mechanical and chemical properties enable it to outperform even high-cost metals and glass in many tough corrosive exposures. On the other hand, its adaptability to modern injection-molding techniques permits the design of parts which eliminate costly assembly and finishing operations. Penton unit costs compare favorably with parts machined from hard rubber or metals, while permitting operating temperatures in excess of 250°F.

This new, *truly functional* plastic can play an important role in your product picture, particularly if you use metering devices or other equipment handling corrosive fluids. For complete details on Penton, including a folder charting Penton's resistance at elevated temperatures to more than 250 different chemicals, call or write:



Here's dramatic evidence of Penton's superior wear characteristics after 100,000 gallons of 220°F. hot-water service. Slot in bronze disc (at top) has worn away to an extent that the meter no longer functions accurately. Penton test disc (center) remains relatively unchanged after same exposure, as compared with production line part (lower photo).

Cellulose Products Department

HERCULES POWDER COMPANY

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GP59-15

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FOREMOST IN VALVES FOR CHEMICAL INDUSTRIES

Over a quarter of a century ago, Powell introduced the corrosion resistant valve to fill the needs of the rapidly expanding chemical industries. And now today, after 25 years of experienced manufacture—Powell offers one of the most complete lines of corrosive resistant valves to handle practically every corrosive fluid.

Valves in every size—for 100 pounds W.P. on up!
Valves in every design—globe, angle, gate, check, "Y".
Valves in every possible metal and alloy—stainless steel, silver, nickel, Monel, Hastelloy alloys, acid bronze, aluminum, and other corrosion resistant pure metals and special alloys. *Powell also offers a complete line of bronze, iron and steel valves.*

So for all *your* industry's requirements, Powell has the right corrosion resistant valve in the right size, right design, and right metal. Look us up at the New York Chemical Industries Exposition . . . consult your local Powell distributor . . . or write directly to Powell for complete information on Powell valves and engineering services. We'll solve all your valve problems!

Powell will be at Booth 133 at the 27th Exposition of Chemical Industries, New York City, Nov. 30-Dec. 4, for consultation on your valve problems. Look us up.

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Dependable Valves Since 1846

POWELL — world's largest family of valves.

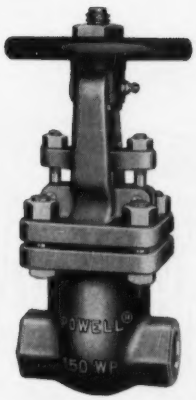


Fig. 2490
Stainless Steel
O. S. & Y. Gate Valve.

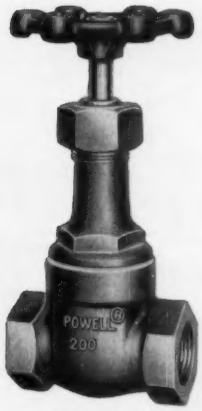


Fig. 1832
Stainless Steel
Gate Valve.

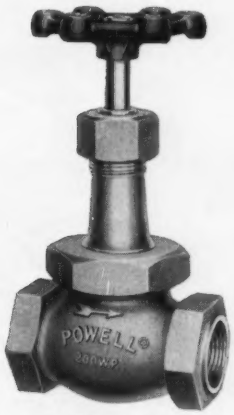


Fig. 1861
Stainless Alloy
Union Bonnet
Globe Valve.

Fig. 2433SS
Stainless Steel
Bolted Cap
Swing Check Valve.

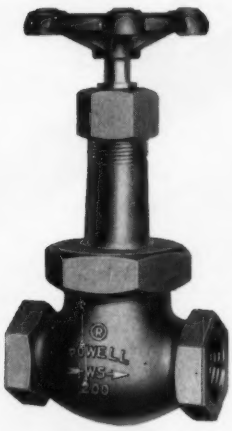


Fig. 2608
Bronze "W.S."
Full Flow
Globe Valve.

Fig. 2310
Flush Bottom
Tank Valve.

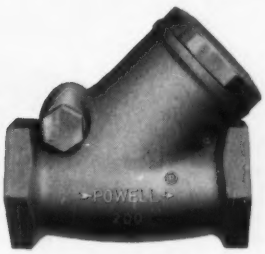


Fig. 560
Bronze Regrinding
Horizontal "Y" Type
Swing Check Valve.

Fig. 2700
Bronze Inside
Screw Rising
Stem Gate Valve.

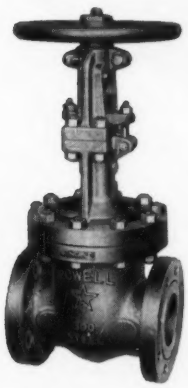


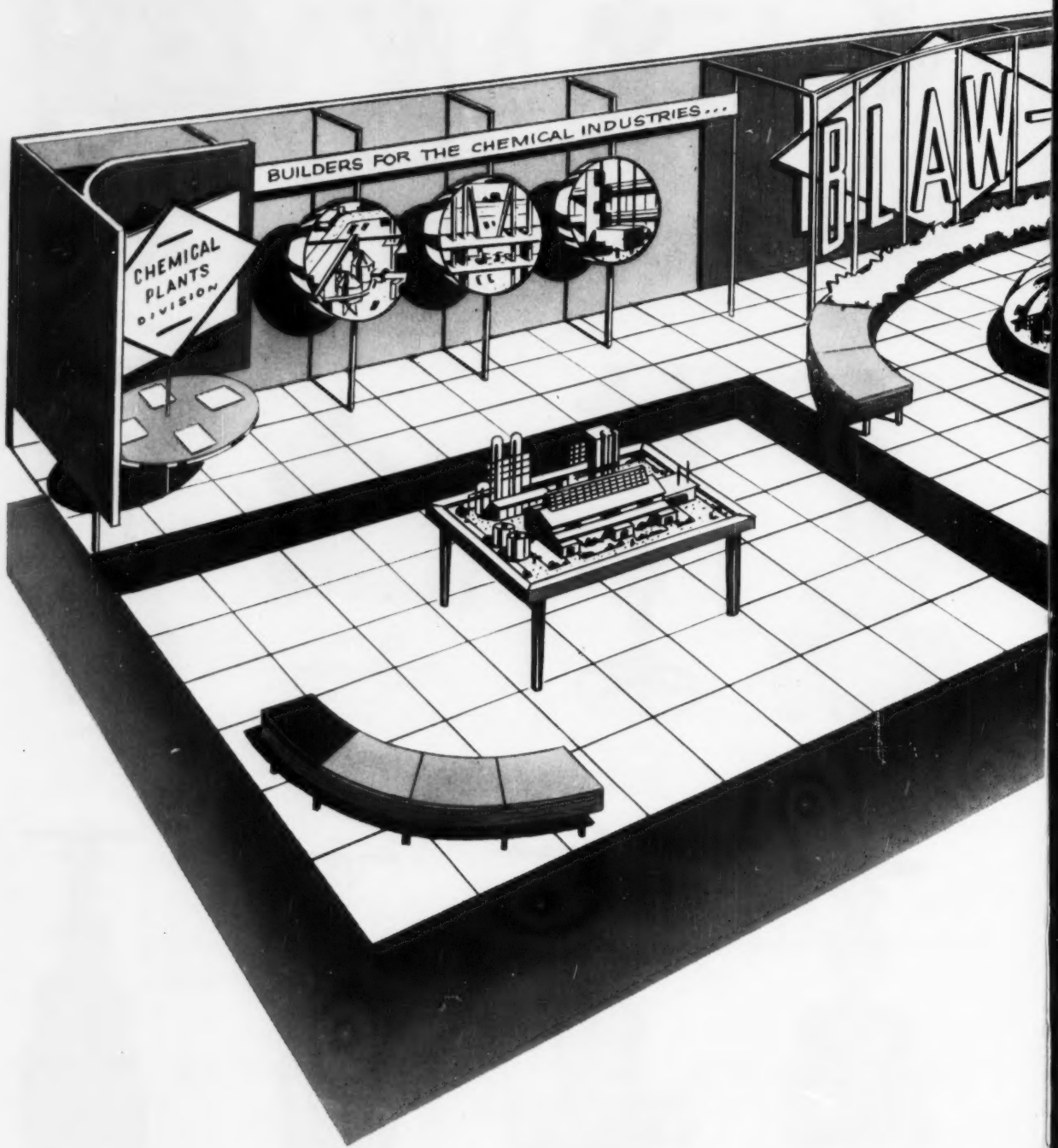
Fig. 3003
Cast Steel
Flange End
Gate Valve.

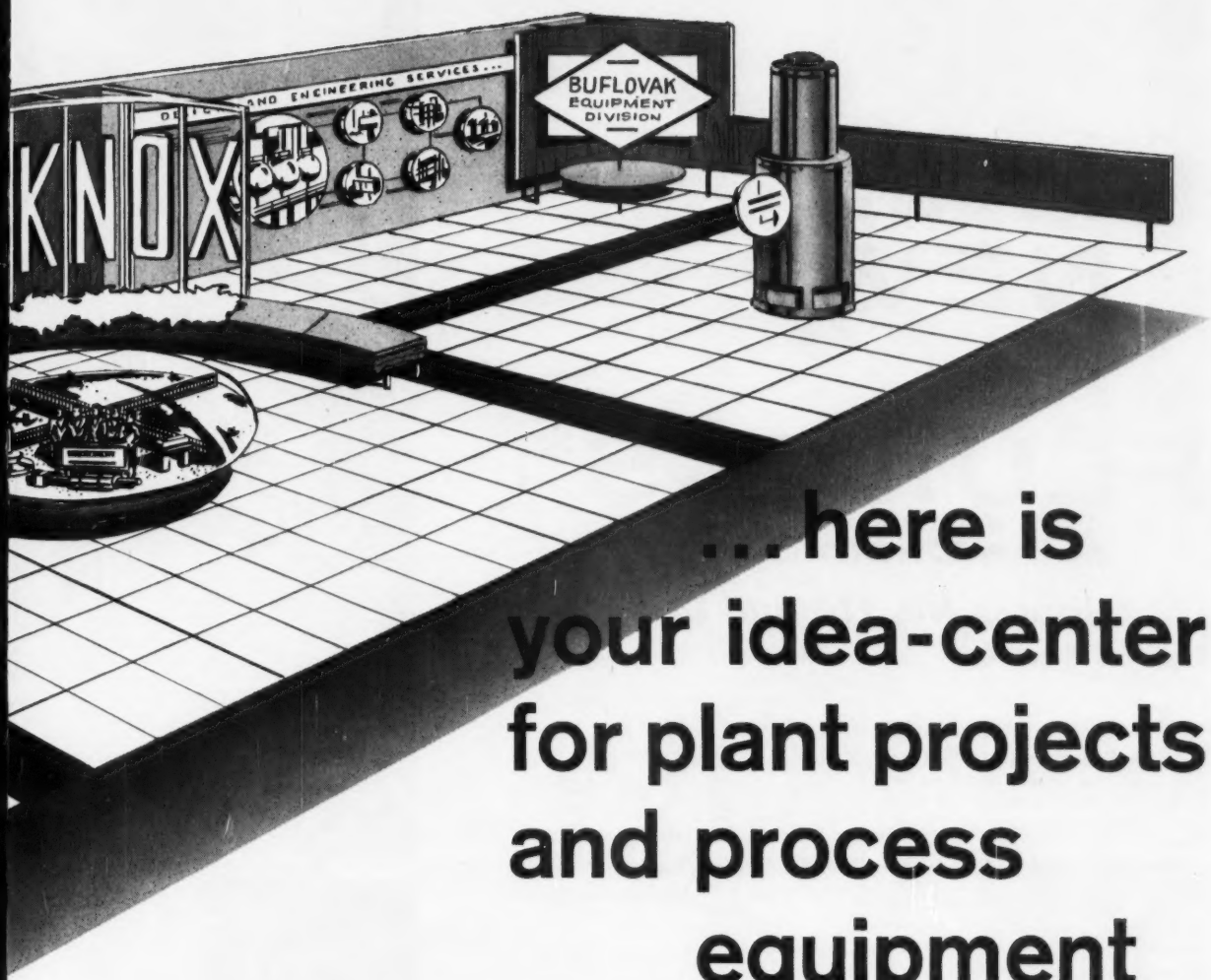
Fig. 19003
Cast Steel
Pressure Seal Valve.

Fig. 1793
Iron Body,
Bronze Mounted
Gate Valve.

Fig. 2193
Ni-resist O.S.& Y.
Gate Valve.

at the chemical show...





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Welcome to Booth 581. We would like to show you the many ways Blaw-Knox contributes to chemical industry growth.

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Process equipment. Buflovak Equipment Division solves diverse problems in drying, evaporating, cooling, and mixing with research, and builds equipment that has been test-proven for the job.

Blaw-Knox's imaginative approach may well provide the best answer to your next plant or process problem. Explore the possibilities at Booth 581.

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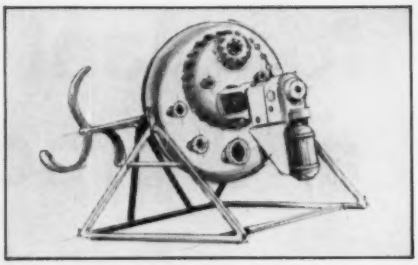
see what's

NEW IN FLUIDICS*

at the Chem Show

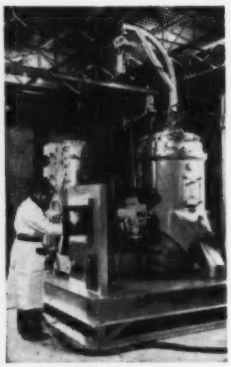
Booths No. 110 and 141



New RA Series Reactor. Features BH Drive for quiet, maintenance-free power. Mirror image top head layout for greater ease in piping. Quick-change "Pfaudlerpac" seal or stuffing box. Offset, bottom outlet. Glasteel 59 construction, of course. 300- to 4000-gallon capacity. Also see all-new stainless steel reactor design.

Improved Material of Construction. Witness a "live" demonstration of the thermal shock resistance of Glasteel 59 — a full 30% increase over previous glassed steels. Inspect Glasteel 59 construction in new Chemo-Blender, new one-foot dryer blender and the new RA Series reactor.

For more information, see us at the Chem Show or write our Pfaudler Division, Dept. CW-119 Rochester 3, New York.



New Inline Test Centrifuge. Simply connect product and utilities to the Titan Superjector Test assembly and you start full-scale production evaluation. Make liquid-solid or liquid-liquid-solid separations up to 6000 gallons per hour. Automatic desludging. Sign up for a field test or inplant evaluation program during the show.

Utilize FLUIDICS locally, almost anywhere in the world. Along with its four plants in the United States, Pfaudler Permutit has manufacturing facilities in the following countries:

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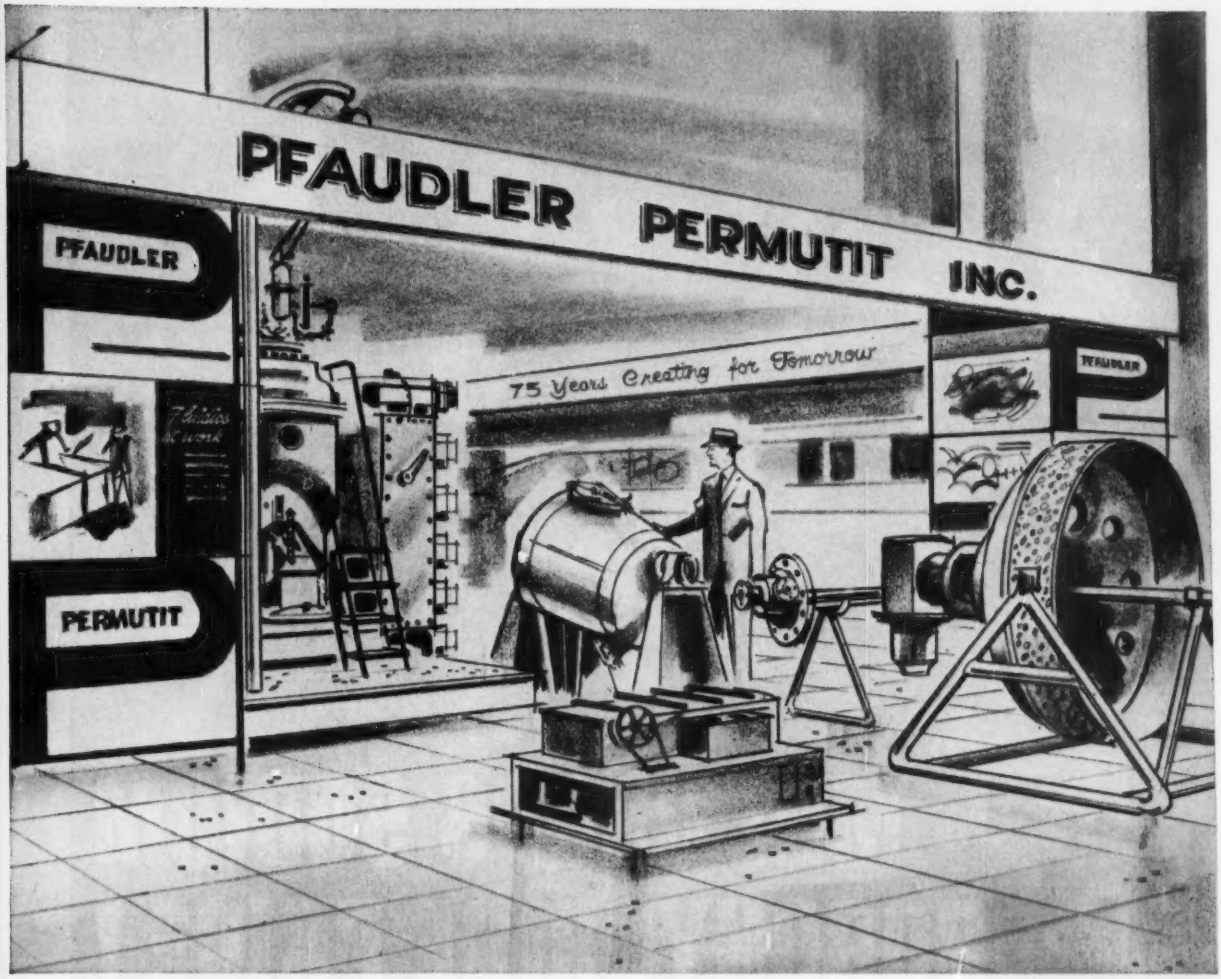
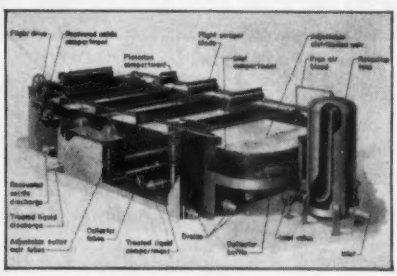
Great Britain: Enamelled Metal Products Corp. Ltd.
Canada: Ideal Welding Co. Ltd.
Mexico: Arteacero-Pfaudler, S. A.
Japan: Shinko-Pfaudler Co., Ltd.



100% Corrosion-Resistant Heaters. Pfaudler tantalum bayonet heaters have virtually *zero* corrosion rate in most corrosive environments. They have high heat-transfer rate with no fouling and offer excellent resistance to physical and thermal shocks. You can get heaters with 1½" and 2" O.D. tubes, single or multiple clusters, up to 15 square feet of heat-transfer area.



New for Industrial Waste Treatment. Inspect a working model of the Permutit Colloidair Separator. See how dissolved air is used to "bubble" solid wastes from liquids. Applications range from paper mills to refineries.

Pilot Size Zirconium Reactor. Fifty-gallon capacity with a .065" zirconium liner. Designed for 150 psi at 350°F. Also displayed will be a 30-gallon tantalum-lined agitated reactor.

*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.

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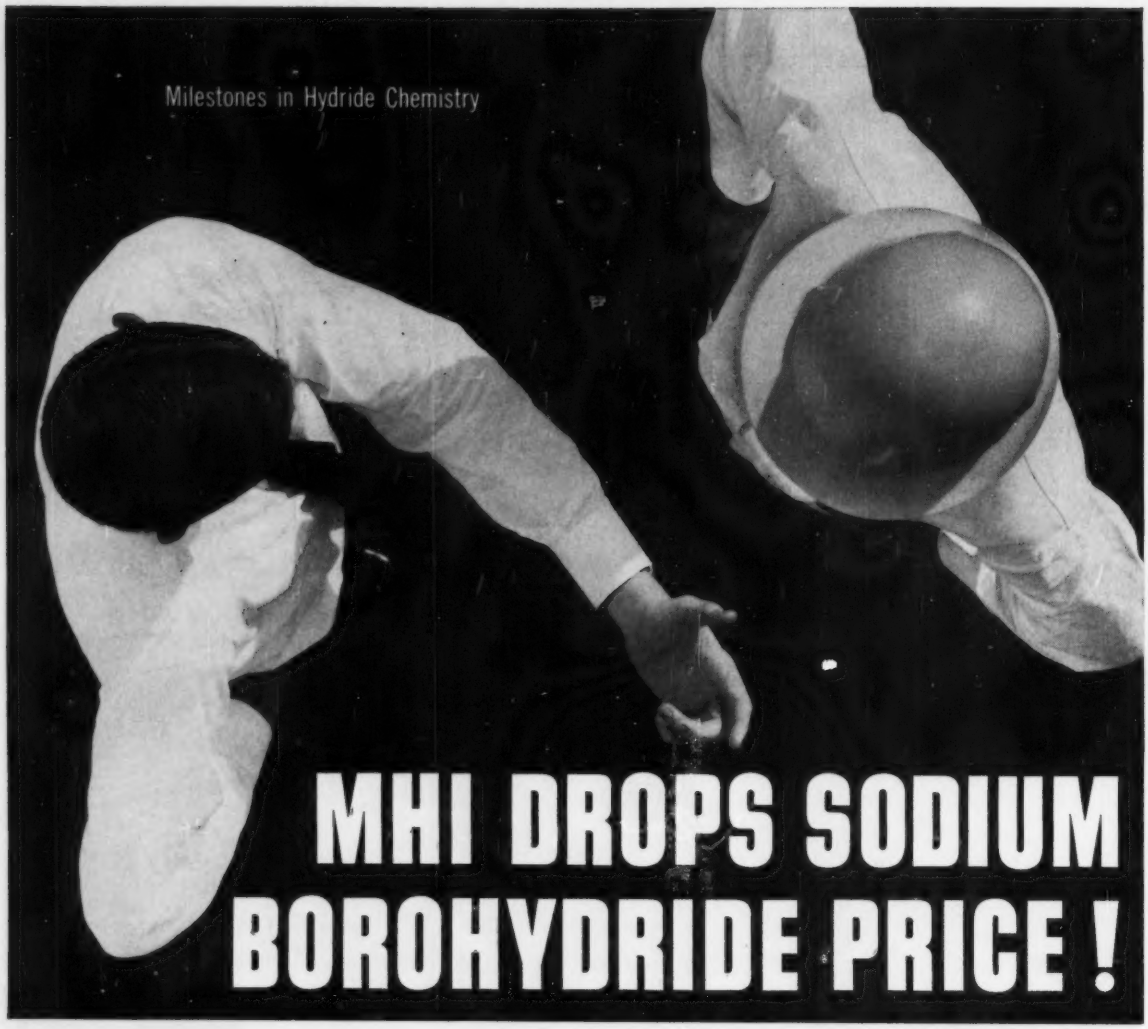

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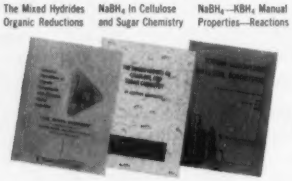
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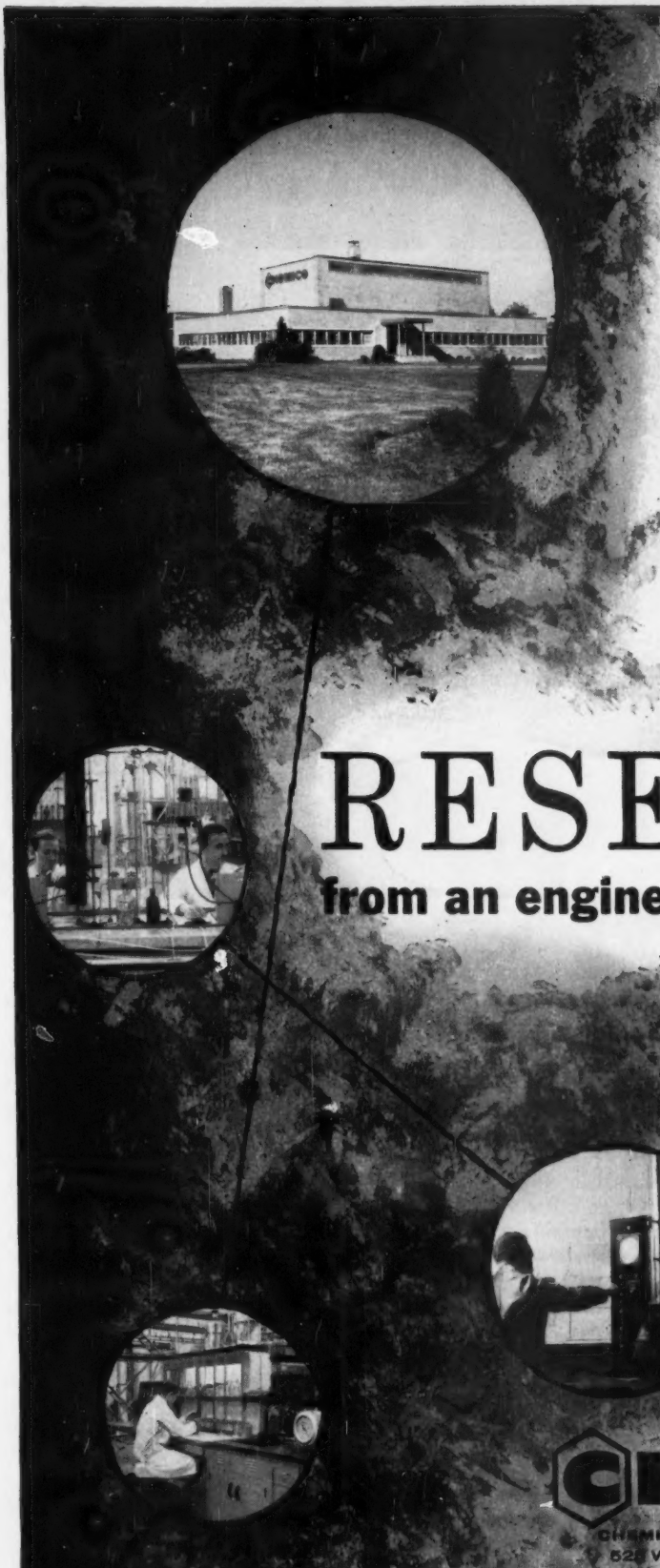

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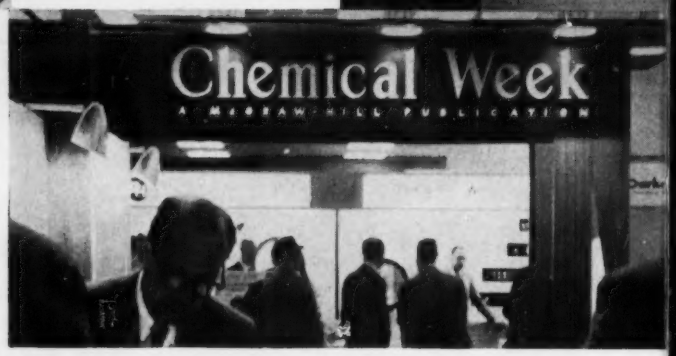
FINAL
CHEMSHOW
COVERAGE



What to See at the Chemshow,

At noon, a week from next Monday, the doors of New York City's Coliseum will open on the 27th Exposition of Chemical Industries. By the time the show closes, the following Friday at 6 o'clock, 35-40,000 visitors from all over the world will have trooped past 550 exhibits on the coliseum's four floors.

Collectively, they will have walked a distance equivalent to four trips around the world. And they will have seen the very latest engineering developments in equipment, instrumentation and corrosion-resistant materials for the 18 chemical process industries.

It could turn out to be the biggest Chemshow yet. The total number of exhibitors will probably fall somewhat short of '57's record. But they will all be aimed straight at process applications; last time, there was a sizable representation from the rocket industry.

Trends to Watch: There will be many innovations at this year's exposition. But they will be concerned with the type of equipment being displayed rather than with the philosophy of the exhibitors. In fact, the significant patterns at the show will be those that started to emerge several years ago:

- Raw-material suppliers will be on hand—Allied, Enjay, Hercules, Victor and others. But these suppliers will be in the minority, will stress engineering applications for their materials. Hercules, for instance, will show off its Penton chlorinated polyether for corrosion-resistant jobs in valves, fittings, other items. Michigan Chemical will display its brominated flameproofing compounds.
- Laboratory supply and instrument companies will, as usual, be there in number. They will be showing their regular wares for research and control jobs in the lab, but will be stressing onstream applications.
- Equipment companies will make up the biggest portion of exhibitors, will have big, splashy exhibits, many with working models of their lines. In keeping with processing trends, they will feature automatized equipment built to withstand higher pressures, higher temperatures, more corrosive conditions.

Mysterious Mistifier: One exhibit that's a good bet to corner a great deal of attention is the Mistifier (*CW Technology Newsletter, Nov. 7*), a novel reactor being pushed by a group of lawyers who have obtained rights to the patents on it (U.S. 2,811,437; 2,845,262).

Essentially, the machine is a rotor

New Products, Trends to Watch

—a whirling truncated cone—inside a stator; facets are cut inside both the rotor and stator. Material entering from the top hits the rotor, is thrown out and hits, head-on, a facet of the stator. The particle falls back against the rotor, and, in that way, material passes down through the machine.

Particle size is reduced and components of the feedstream then are thrown into violent, intimate contact. Uses envisioned for the Mistifier include: a reactor to bring about quick reactions, help convert batch to continuous processes; an aid to such unit operations as gas absorption, extraction, drying, size reduction and distillation. A revved-up version of the present model, it is suggested, might make an efficient homogenizer.

Corrosion Fighters: Other exhibits that are good bets to win considerable interest will be those featuring corrosion-resistant materials. Glascote Products, Inc. (Cleveland), subsidiary of A. O. Smith Corp., will unveil a new glass—Glascote 778—which, it says, has proved out as more acid-resistant than the borosilicate-type laboratory glass. It's destined for use in the firm's line of glassed steel equipment.

Metal-Cladding, Inc., will show a prototype of its Kabe-O-Rap reinforced polyester tanks. They're wrapped in cable to provide extra strength. National Carbon will feature its new Type G globe valve and a modular entrainment separator, both made of Karbate impervious graphite. Falls Industries will exhibit its line of impervious graphite control, ball, flush, sleeve and safety valves, said to be the first made of that material. Barnebey-Cheney Co. will demonstrate its carbon wool, available in seven standard grades, either activated or inactivated. Its booth will encourage audience participation.

The Wm. Powell Co. will have models of zirconium and titanium valves along with its regular line. Swepco Tube Corp. will show its rock-forged pipe, which is now marketed in sizes not previously available. The key to its process is a forging operation that recrystallizes the weld in a stainless pipe, converting it from a cast into a wrought structure.

A new use for titanium as a construction material that may have a far-reaching effect in the electrochemical field, will be demonstrated by Crucible Steel Co. of America. The firm will display a pilot-size chlorine-caustic diaphragm cell with platinum-plated titanium anodes. Electrolytic cell users are already

3M COMPANY CHEMICALS

THE RAW MATERIALS OF PROGRESS

COMMUNICATIONS SYSTEM POWER UNIT

POWER...IN THE SPAN OF A MAN'S HAND...

This remarkably small 1 KW linear power amplifier (entire unit is approximately the size of an 8½" cube) was developed by the Communications Division of Hughes Aircraft for the U. S. Air Force B-58 bomber.

With a blend of 3M Company's FC-75 and FC-43 as a dielectric coolant, the amplifier provides all the high-power output required by this huge aircraft's HF communications system, yet withstands all military environments at temperatures from —55°F. to +200°F. Here's why: the circuitry of the amplifier is immersed in this non-corrosive, non-flammable inert fluid which protects it against internally generated heat through a highly efficient evaporative cooling process. There are no hot spots, and a uniform temperature is maintained throughout.

By using FC-75 and FC-43 in this way, Hughes Communications Division engineers were able to achieve a "compression in volume of a factor of 6" when developing this amplifier for use in an area where space is at a premium. Other areas of application now under investigation include submarines and ground base systems.

Why not investigate the remarkable properties of 3M Inert Fluids in terms of your product design, miniaturization or performance problems? For complete data, write: 3M Chemical Division, Dept. KAK-119, St. Paul 6, Minn.

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...WHERE RESEARCH IS THE KEY TO TOMORROW

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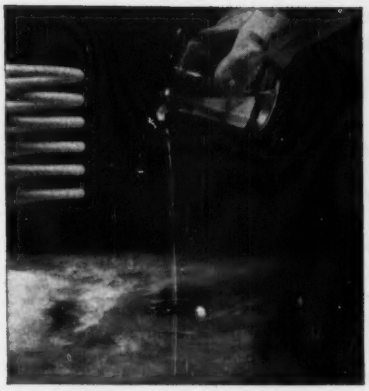

THERMAL AND CHEMICAL STABILITY as well as dielectric properties make 3M Brand Fluorochemical FC-75 and FC-43 right for use in the Hughes Power Amplifier. FC-75 has a useful liquid range of −150°F. to +212°F. at atmospheric pressure, with a viscosity of 16 Centistokes at −90°F. In addition, it offers these other useful properties: high dielectric strength in both liquid and vapor state (37 KV 0.1" gap for liquid) . . . self-healing in high voltage electrical equipment . . . excellent wetting power . . . compatible with materials commonly used in the construction of high temperature equipment . . . thermally stable to temperatures in excess of 750°F. and, even under extreme use conditions, does not form sludge or corrosive products. Heat capacities in liquid and vapor state are approximately equal.

FC-75 COOLED!

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- **DISPERSION COATINGS**
- **FUNCTIONAL FLUOROCHEMICALS**
- **SURFACTANTS**
- **AND INERT LIQUIDS**

evaluating similar anodes as low-maintenance, low-operating-cost replacements for carbon electrodes (*CW Technology Newsletter, July 25*).

A second unit displayed by Crucible will utilize titanium chips for scrubbing the chlorine and sodium hydroxide from the diaphragm cell in the production of sodium hypochlorite. Both process units were fabricated by Struthers Wells Corp. The welded titanium tubing was supplied by Trent Tube Co.

Wet and Dry Separation: Materials of construction will also have a feature role in the exhibits of filter makers. J. G. Brown & Co. will show what it says are the first injection-molded plastic filter press plates produced commercially. And T. Shriver & Co. will display epoxy-coated wood filter plates for corrosive service; it will also show plastic plates.

Both Brown and Read Standard Division of Capitol Products will demonstrate filters that are radical departures from conventional design. Brown has a reversible filter with a thin porous membrane. Water flow direction through the membrane is periodically reversed so that both sides of the membrane are used for solids collection.

Read Standard has adapted the plate-and-frame press for quick opening and cleaning (*CW, Oct. 31, p. 79*). The press operates on a short filtration cycle that prevents cake build-up, keeps filter flow rate high. The press is said to outperform other types of units, cut labor costs.

The Eimco Corp. will show its new continuous-belt filter that replaces a metal belt with cloth, should broaden the range of materials the filter can process. Zippers permit cloth-change time to be cut from several hours to 20-30 minutes.

Alsop Engineering Corp. will accent units for submicron particle filtration and nuclear applications. American Machine and Metals, Inc.'s display will highlight the development of new filter fabrics—an area of filtration that is receiving increasing research attention.

The Sharples Corp. is aiming for the attention of researchers with its new Model DHL, a centrifuge that offers high capacity for the laboratory and pilot plant. The unit is also suggested for small-plant production. The company plans to show the Micromerograph, a particle-size distribution analyzer, in addition to six centrifuge models.

The DeLaval Separator Co. will show several different types of centrifugals and its stainless steel plate-type heat exchanger. Centrico will feature Big Sam, Westfalia's high-capacity automatic desludger. Baker Perkins' Chemical Machinery Division will show four new automatic centrifuges, plus mixing and kneading equipment.

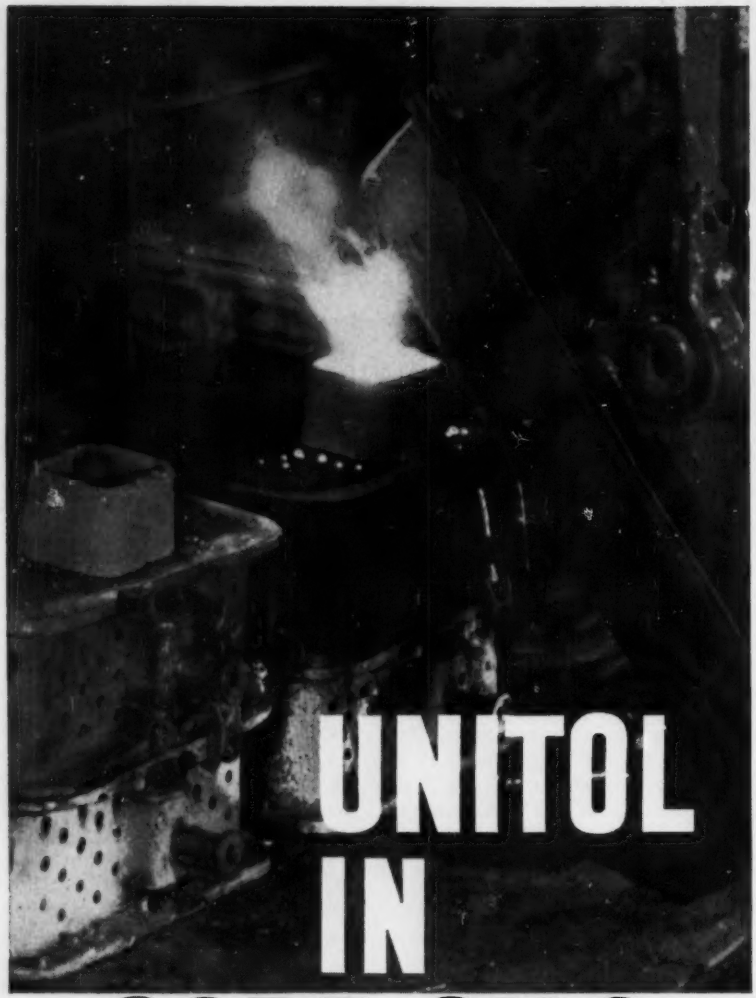
For the separation of dry materials, Buell Engineering Co. will display centrifugal and gravitational classifiers that have no moving parts, require low power input, have high separating efficiencies.

Two makers of bag-type dust collectors will point up the trend to glass bags that permit high-temperature operation. Western Precipitation Corp. will display the Therm-O-Flex filter, a new type of woven glass bag for use at temperatures up to 550 F. And Fuller Co.'s Dracco Division will be talking about its glass-bag filter that features bag cleaning with sound waves (*CW, Nov. 14, p. 101*). Sonics clean the bags effectively without breaking the glass fibers, cut pressure drop and power costs.

Measuring, Metering: Instruments and metering devices will get a big play this year. Mettler Instruments will exhibit analytical balances and precision scales but will emphasize electronic weighing devices for the production line as well as for the laboratory. Technicon Controls will have a booth showing automatic analytical systems that can run as many as 60 tests an hour, can continuously monitor concentrations of materials such as silica, cyanides, phosphates, sugars, aluminum, iron, copper.

C. W. Brabender Instruments Inc. will have a Plastic-Corder, an instrument for measuring the plasticity of coal, ceramics, polymers or other materials at temperatures as high as 650 C. Aeronautical Instrument Division of Robertshaw-Fulton Controls Co. will display a new continuous level indicator and a malfunction detector for rotating and reciprocating machinery, said to be low-cost.

Milton Roy will aim its display toward instruments for process stream control. It will show off new impedance-type position indicators, a



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Chemical Products Division
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level control, an oxygen gas meter, a colorimetric analyzer for spotting impurities in process solutions and controlled volume pumps for metering small flows of liquids and slurries. Eco Engineering will exhibit a new device for valving small flows of viscous materials. Atmospheric pressure pushes the liquid into a vacuum pocket providing a constant supply in the gear chamber. It's said to enable positive dispensing with an accuracy within 2%. Blackmer Pump Co. will demonstrate a variable volume pump designed to deliver from 10 to 1,000 gal./minute. It works on an eccentric pump liner that can be operated manually or automatically, can control delivery rates or even reverse the direction of flow without changing pressure or pump speed.

Moving Materials: The trend toward automation will be clearly evidenced in the materials-handling and packaging exhibits. Richardson Scale will provide the first public showing of its Formula Capsule, which automatically determines the proper proportions of ingredients for various operations.

A pocket-size network of electronic components in a tough cover, the capsule can program the sequence and weighing of as many as 24 solid or liquid ingredients in a single formula. At the show, it will be integrated with a proportioning panel, including weight selectors and formula board.

Fuller Co. will exhibit a new packaged feeder and blower combination designed for field handling of dry bulk materials. Specialty Machine Co. will display its new drum handling equipment designed for lifting, pouring and stacking drums and other containers. Bemis Bro. Bag Co. will have at its booth its machine, which it bills as the first, fully operational automatic open-mouth multiwall bag feeder.

Equipment designed for hazardous locations will also be prominent this year. Vibro-Plus Products, for instance, will display an external vibrator for bins, chutes, tables and other items in hazardous spots. Eriez Mfg. will demonstrate vibratory feeders specially designed for duty in dusty, dangerous atmospheres.

Something for Everyone: At other booths, you'll be able to see such

items as a portable controlled-environment room, developed by Electric Hotpack Co. It can be assembled in a few hours without blueprints, is intended to permit conversion of existing space without disrupting production or necessitating costly new construction.

Electric motor manufacturers will emphasize insulation that permits use of open, dripproof motors in applications that have required enclosed motors. Louis Allis Co. will display its polyester-resin Capsular insulation system for random-wound, alternating-current squirrel-cage motors, and its Capsulex system, which features use of Dacron and glass tape, silicone elastomer and polyester web tape for the formed coils of large ac. motors.

General Electric will show ac. motors with recently introduced Polyseal insulation (*CW Technology Newsletter, May 23*), will also exhibit a mass flowmeter that records liquid and gas flow directly in pounds (*CW, May 23, p. 80*), and a new motor starter featuring simplified maintenance (*CW, Sept. 19, p 74*).

Not all the exhibitors will be demonstrating new items or specific pieces of equipment. Pfaudler Permutit, for instance, will be stressing the idea of "Fluidics." Pfaudler has, of course, long been identified with glass-lined equipment. But because of its recent merger with Permutit and the general broadening of its line, it's now out to sell the idea that it can settle all types of problems involving the handling of fluids.

Sprout, Waldron will show no equipment at all. Instead, it has asked for materials-handling problems, and will supply solutions for them at the show. Brooks Rotameter Co. will be showing rotameter flow measurement and control adaptable for modern advanced process instrumentation, such as data reduction. But it will also be pointing with pride to its new standardization program, which enables the user to interchange basic metering components.

For the most part, however, the Chemshow this year will feature new equipment, new instruments, new materials and new ideas. In fact, if you're looking for an item to do a particular job in the process industries and can't find it at the Chemshow, chances are it hasn't yet been invented.

NEW FROM CONTINENTAL

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Polyol Portraits: the POLYGLYCOLS

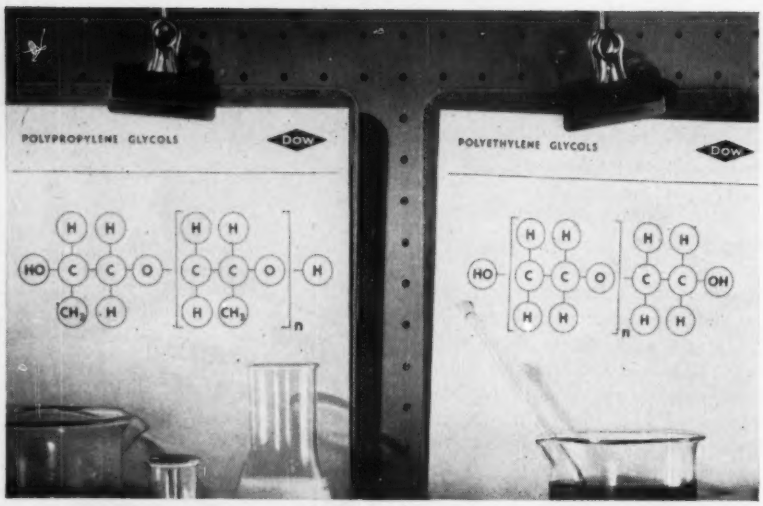
one in a series by "the men that make the most of them"

The polyglycols—relative newcomers to the chemical scene—are rapidly entering industry after industry in new capacities as intermediates and formulating ingredients. What do polyglycols have that causes such rapid expansion? They are so exceedingly varied and adjustable that chemists can virtually write their own prescriptions of physical and chemical properties and, chances are, a polyglycol can be developed to fit them.

The list of valuable polyglycol characteristics is extensive: High flash point, thermal stability, excellent lubricity, wide viscosity ranges, non-corrosiveness, ease of esterification, low toxicity and many other desirable properties that have a wide range of application.

These properties can be blended into almost endless combinations depending primarily upon the oxides used. Dow, with five high-quality oxides, is able to provide the widest available range of polyglycols. These five oxides (ethylene, propylene, butylene, epichlorohydrin and styrene oxides) place Dow in an ideal position to develop polyglycols with made-to-order properties. For example . . .

The automotive industry needed a material for use in hydraulic fluids with properties similar to those of castor oil.



Portrait of two valuable formulas in the working vocabulary of creative chemistry.

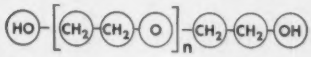
Dow's answer was the new Polyglycol 11 series, a family of five new trihydroxy polypropylene glycols made by adding propylene oxide to glycerine. The compounds are viscous liquids through the entire range of the five viscosities, 80 through 400 cks. at 100°F. Besides having properties needed for use in hydraulic fluids, members of the 11 series have proved successful as plasticizers and also show promise as ingredients in hair oil—a typical example of versatility. Other Dow series provide equally valuable properties, equal versatility.

New applications and new polyglycols are being continuously investigated by Dow. Literally *hundreds* of Dow polyglycols are now available and *thousands* more are possible from "the men that make the most of them." The two broadest branches of the Dow polyglycols, which have been well estab-

lished throughout the years of polyglycol development, are the polyethylene glycols and the polypropylene glycols.

The Polyethylene Glycols

The polyethylene glycols are available as liquids or solids, in a molecular weight range from 200 to 20,000. Polyglycols E200, E300, E400, and E600 are liquids. E1000, E500M, E1450, E4000 U.S.P. and E4000, E6000, E9000 and E20,000 are solids.

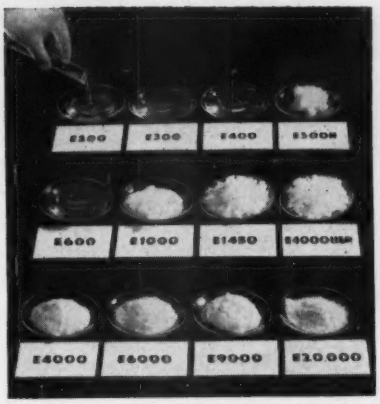


The liquids are viscous, nearly colorless, water-soluble and have low vapor pressure. They are completely miscible with a large number of organic liquids but are only slightly soluble in aliphatic hydrocarbons. And they have this very interesting characteristic: their viscosities and solubilities in organic solvents *rise* with increasing molecular weight; while their vapor pressures and hygroscopicities decrease.

The solids, like the liquid members of the series, are soluble in water and many organic solvents. Melting or freezing points rise as the molecular weights of these relatively non-hygroscopic polymers increase.

The terminal hydroxyl groups enable the polyethylene glycol molecule to take part in esterification and etherification reactions. The resulting esters and ethers are often useful surface-active agents or solvents.

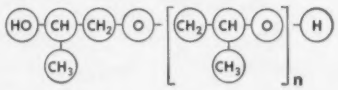
The excellent chemical and physical properties of the polyethylene glycols make them ideal for a multitude of uses. Because of their water solubility,



Twelve different polyethylene glycols ranging from liquid to solid offer unique opportunities for product improvement.

low order of toxicity and wide range of compatibilities, polyethylene glycols are being used in increasing quantities by the pharmaceutical and cosmetic industries as bases and carriers. The PEG's are equally important in such uses as mold release agents, cellulose plasticizers, process lubricants, and many others.

Polypropylene Glycols



This family of six light-color, slightly oily liquids has physical and chemical properties derived from methyl side chains, many ether linkages and from terminal hydroxyl groups. The hydroxyl groups enable the polyglycols to take part in reactions in a manner similar to that of a secondary alcohol.

Available in molecular weights ranging from 250 to 4,000, these versatile polyglycols find application in a wide variety of products and processes because of their excellent lubricating and solvent properties. They are characterized by their high flash points, low volatility, excellent solubilities, good viscosity-temperature relationships, low pour points, low surface tensions, low hygroscopicities and their ability to react with fatty acids to form interesting surface-active materials. These properties, which vary considerably with average molecular weight, can be combined by blending members of the series, presenting endless opportunities for uses in automotive products, cosmetics, dyes, printing inks, leather, plastics, textiles and vegetable oils.

Dow's technical service men are prepared to meet your precise requirements. Often, their broad experience saves valuable time and adds the refining note to a given application.

Dow is Basic in Polyols

Whether you're in the market for glycols, PPG's, PEG's, glycerine or any of the hundreds of other Dow polyols, you receive these benefits:

1. You always get the highest quality and uniformity in Dow polyols because Dow makes and controls the quality and uniformity of the *ingredients* for all their polyols.

2. You are assured of plentiful, continuous supply. As Dow itself is the original source for raw materials, it better controls factors of availability.

3. Multiple production and supply points, at strategic locations throughout the country, assure you of prompt service and delivery.

4. From the creative cauldrons of polyol chemistry at Dow come scores of *new* polyol products and polyol improvements each year.

There are literally *no material limits* to the range of new developments that can be custom-made for Dow customers!

★ ★ ★ ★

***"The men that make the most of them"* stand ready to help you make the most of the polyol products you need. They are always at your service. If you have a polyol problem, write THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemicals Merchandising Department 1103AM11-21.**

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

DOW

THE POLYOL FAMILY TREE

Main branches include: **Glycerine • Glycerine USP • Glycerine USP 99.5% Propylene Glycol, Industrial • Propylene Glycol USP • Dipropylene Glycol Tripropylene Glycol • Ethylene Glycol • Diethylene Glycol • Triethylene Glycol Tetraethylene Glycol • Polyethylene Glycol • Polypropylene Glycol Polystyrene Glycol • Polyepichlorohydrin • Hyprose® SP80 • Hyprin® GP25 Polybutylene Glycol • Styrene Glycol • Dowanol® 122 • Polyglycol 11 Series Polyglycol 13 Series • Polyglycol 15 Series**

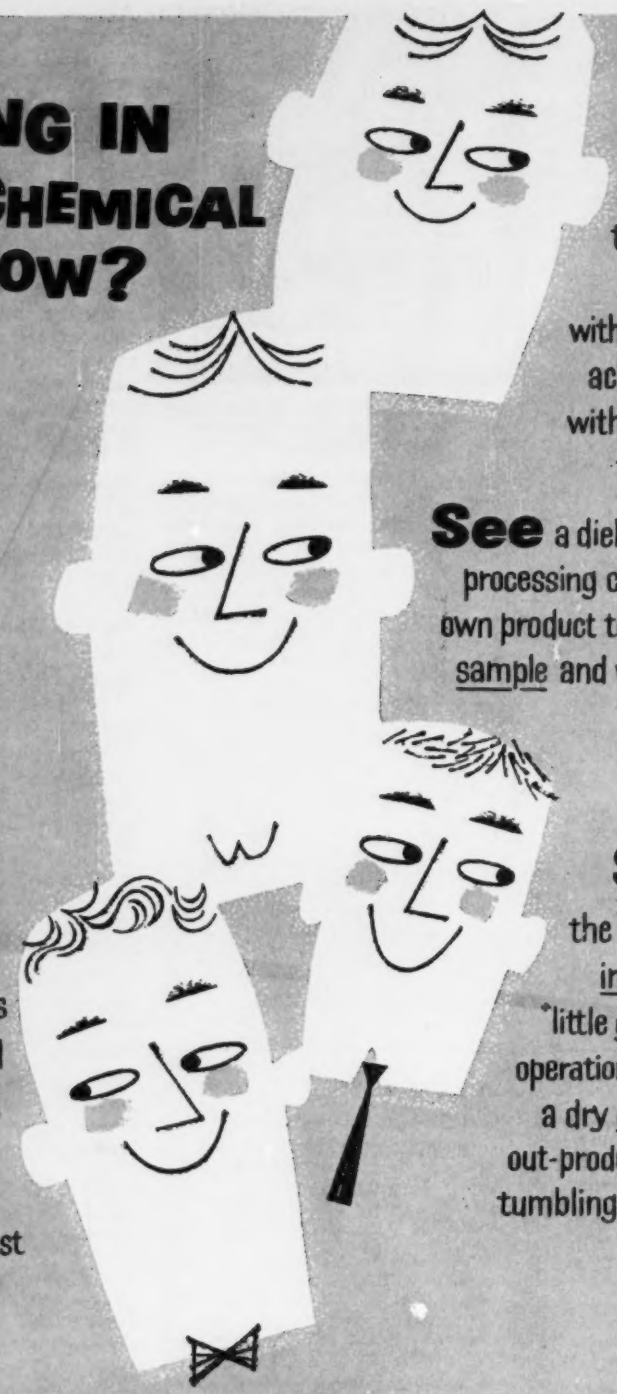
Oxides: **Ethylene Oxide • Propylene Oxide • Butylene Oxide S Styrene Oxide • Epichlorohydrin**

The Polyglycols number many active members, among them three new products developed by Dow research—polyepichlorohydrin, polystyrene glycol, and polybutylene glycol. All three are adaptable as intermediates in the production of the new polyurethanes and in the surfactant field. Many promising applications also exist in paint, petroleum, detergents, plastics.

The Polyethylene Glycols are available in twelve molecular weights from E200 to E20,000, and ranging from viscous liquids through waxy and hard, tough solids. Very useful as plasticizers, lubricants, solvents and as carriers in many cosmetic and pharmaceutical preparations.

The Polypropylene Glycols "P" series, liquid through entire molecular weight range, P-250 through P4000. Employed as lubricants, solvents, plasticizers and anti-foam agents. Polyglycol P2000 (resin grade) has gained widespread acceptance for use in urethane foams.

TAKING IN THE CHEMICAL SHOW?



See the actual Super-Seal open motor that withstood two years of acid atmosphere without adverse effect.

See a dielectric heater processing chemicals-see your own product tested-bring a small sample and we'll run it.

See the Vibrating Ball Mill in operation-this "little giant" used in batch operation or as the heart of a dry grinding plant, out-produces a conventional tumbling mill twice its size.

See pumps galore--vertical and horizontal, general and special, for handling most any liquid.

...and see more --much more--at the Allis-Chalmers Chemical Exhibit in New York, Nov. 30 to Dec. 4, Booths 636 to 646. Make it a "must see!"

ALLIS-CHALMERS

A-1199-C

FINAL
CHEMSHOW
COVERAGE

How to Get the Most from Chemshow

Whether you're visiting the Chemshow from out of town or whether you live and work in metropolitan New York, you can get more out of your visit by keeping these few things in mind:

First day (Nov. 30) the show opens at 12 o'clock noon. For the rest of the week, it will open at 10 a.m. On Monday and Thursday, it will remain open until 10 p.m. The other three nights, it will close at 6 p.m.

The big crowd attends late in the week. Thursday is traditionally the biggest day. If you can attend early in the week, you can avoid the crowds and see more. If you plan to spend some time there and want to wrap it up in one day, Monday is the best day to do it. The exposition is open Monday night. Moreover, it's a long, hard grind for the people manning the booths. They'll be fresher—and you can get much better service—earlier in the week.

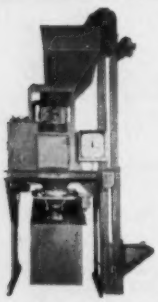
Remember, too, that there are 550 exhibits. Spending one minute at each one adds up to a solid nine-hour day. The best way to see the show is to plan your time there. A popular approach is to make a hurried tour, then to go back and concentrate on special areas. But in a quick trip, you're likely to miss some important items. To avoid this, you'll have at your disposal several floor plans and guides to exhibits at the show (*see pp. 103-108;* also, CHEMICAL WEEK and *Chemical Engineering* will publish a program).

The Chemical Week: The week of the Chemshow is customarily a big one for chemical men. The American Society of Mechanical Engineers is meeting that week in Atlantic City, and it's possible to tie that into a visit to the exposition.

As in the past, the social calendar

If you overweigh you lose money...
If you underweigh you lose customers!

Richardson Automatic Bagging Scales are the answer to this problem. They provide high speed bagging with accuracy that eliminates giveaway of product, avoids customer complaints of shortweights. Higher production speeds mean reduction in costs, too.



The Richardson E-50 Bagging Scale gives you all these benefits –

Accuracy – within 1 ounce at speeds of ten or more 50-lb. bags per minute!

Versatility – handles weighings from 5 to 200 lbs. of grains, plastics, powdered and granular chemicals, feeds and meals, pellets, sugar, salt, and many others.

Dependability—ruggedly-built for years of trouble-free service.

For full details on the Richardson E-50 and other bagging scales write today.

Richardson Scales conform to U.S. Weights and Measures H-44 for your protection.

Here's the answer ...

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

1790

RICHARDSON SCALE COMPANY • CLIFTON, NEW JERSEY

Sales and Service Branches in Principal Cities • Also manufactured in Europe to U.S. standards

will include two chemical dinners:

• On Tuesday, the Kirkpatrick Awards will be presented (*see also p. 16*). A black-tie affair, the dinner for these honors will be held in the Grand Ballroom of the Hotel Astor; a reception will start at 7 p.m.; dinner will be at 8. At the dinner, the Kirkpatrick Award for Chemical Engineering Achievement, sponsored by *Chemical Engineering*, will be given to Texaco, Inc., for its development of the partial oxidation process to make synthesis gas. The Kirkpatrick Award for Management Achievement (sponsored by CHEMICAL WEEK) will be given to Food Machinery and Chemical Corp. (*CW, Oct. 3, p. 36*). Featured speaker will be T. Keith Glennan, administrator of the National Aeronautics and Space Administration. His topic: "Framework for Achievement."

• On Wednesday, the American Chemical Society will have a dinner at the Henry Hudson Hotel, at which Guy Suits, director of research for General Electric, will speak.

The Social Week: If you're visiting New York from out of town and are interested in seeing a Broadway show, the best bet is to write to the box office at once. Probably second best bet is to check with the theater box office as soon as you arrive; occasionally, it's possible to buy tickets for the hit shows, due to last-minute cancellations. If you can't get a ticket from the box office, one of many reliable brokers will probably be able to get one for you for a slight premium; the hotels also have tickets available.

The Metropolitan Opera is in season, of course. And generally tickets are available. They go on sale 10 days before the opera opens, and go fast. But it's usually possible to get "obstructed view" seats in the dress circle or balcony right up to the last minute. True music lovers usually don't find the "obstruction" (a thin pole for ceiling support) irritating.

For other music lovers, there's a concert practically every night at Carnegie Hall. The New York Philharmonic holds forth Thursday and Saturday nights, Friday and Sunday afternoons. It's difficult to get tickets for Thursday evening, relatively easy to get them for Friday afternoons. Tickets for non-Philharmonic perform-

NOW... Hammond TUBESEALS*

Guaranteed for storage of HIGH AROMATICS

HERE'S GOOD NEWS FOR PRODUCERS AND HANDLERS OF HIGH AROMATIC CHEMICALS

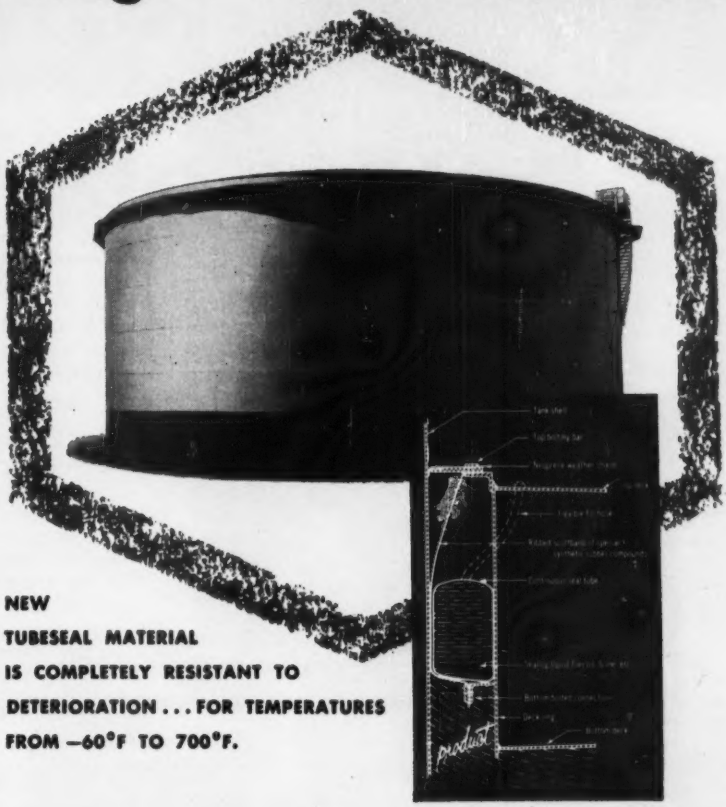
Elimination of evaporation losses and protection against product contamination of high aromatics in storage is now possible with the new Hammond Tubeseal System* for floating roof tanks. The new tubeseal material overcomes deterioration problems experienced with other sealing materials. Hammond Tubeseals are guaranteed for storing products containing 75% aromatics and for a wide range of other difficult liquids.

A Hammond Floating Roof Tank, with the new aromatic-resistant Tubeseal System, is the answer to liquid storage of high aromatics . . . and the Tubeseal Floating Roof can be installed on new or used tanks of riveted or welded construction.

ELIMINATE LIGHTNING FIRES:

The Hammond weathershield, a standard part of the Hammond Tubeseal System, is completely electro-conductive to eliminate the possibility of lightning fires.

Send us the details on your storage facilities and requirements. We will be glad to offer you the benefits of more than 50 years of liquid storage experience.



NEW TUBESEAL MATERIAL IS COMPLETELY RESISTANT TO DETERIORATION . . . FOR TEMPERATURES FROM –60°F TO 700°F.

INCLUDED AMONG THE AROMATICS AND OTHER CHEMICALS WHICH CAN NOW BE STORED IN HAMMOND TUBESEAL FLOATING ROOF TANKS ARE:

- ISOPROPYL ETHER
- ALLYL ALCOHOL
- ALLYL CHLORIDE
- HEXALENE GLYCOL
- ETHYL ALCOHOL
- ISOPROPYL ALCOHOL
- ETHYL GLYCOL
- BENZENE
- CREOSOTE OIL (CREOSOL)
- TOLUENE
- NAPHTHA and HYDROGEN SULFIDE
- TURPENTINE
- XYLENE
- BUTYL ALCOHOL
- SULPHURIC ACID 95%
- METHYLENE CHLORIDE
- TRICHLOROETHYLENE
- ETHYLENE DICHLORIDE
- BENZYL ALCOHOL
- AMYL ALCOHOL
- PROPANEDIOL

*Patented

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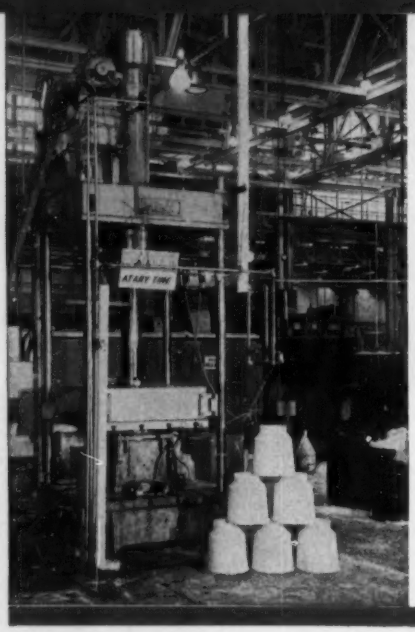
news briefs...

ON THE CREATIVE USE OF M&C PROCESS MATERIALS



*Reinforced Plastics many-ways better—and lower-cost—with ASP fillers

Performance characteristics of fibrous glass-reinforced polyester and epoxy plastics are vastly improved when they're filled with M & C's aluminum silicate pigment fillers . . . yet this is accomplished at lower material costs. The ASP displaces in part the more costly resin.

Rank in *your own* order of importance these benefits to *your* moldings:

improved smoothness, gloss, opacity
lower peak polymerization temperature, shrinkage
reduced water absorption
improved physical properties—flexural, impact, tensile, compressive
better workability—wet-out, thixotropy, lubricity

And remember, all this at *high loadings—for real savings.* Get the whole story on *why* the ASP's work so well—for example, their absorption of the exotherm of polymerization to keep down peak temperatures. This is a *starred* item . . . use the coupon.

Trouble with caking? not with low-cost, easy-to-use Attacote® on the job

Solids that cake up or agglomerate during manufacture, storage, or transit—whether due to their own natural stickiness (hygroscopicity), severe environment, or handling—will be kept free-flowing with Attacote. Attacote is an attapulgite product of fine particle size, averaging 8 microns—its light, neutral color blends well. Its virtual inertness insures compatibility. Attacote is low in cost . . . uniform in quality . . . easy to use. A little goes a long way—only 0.25 to 3.0% is needed for many applications. Equipment can be kept simple—just tumble or mix Attacote with your product. It goes right to work! An evaluation of Attacote with your product may bring a better solution to your problems. Let us help . . . use the coupon.

Visit our Booth No. 950 at the CHEM SHOW.

Minerals & Chemicals Corporation

7046 Essex Turnpike, Menlo Park, New Jersey

Leaders in creative use of non-metallic minerals

Export Department: Room 150 Garden State Parkway, Menlo Park, N.J. (Cable Address: "MICOR")

*Papermakers: M & C storage capacity builds versatility in your production

As production of *clay-containing papers* grows (*Chart 1*), Minerals & Chemicals builds storage capacity of famous M & C Edgar Paper Clays ahead of the market (*Chart 2*) to assure papermakers of immediate shipments of desired grades in adequate quantities.

Growth of storage capacity also indicates increasing use of M & C Paper Clays . . . actually a steeper upward curve than the curve for *clay-containing paper* production . . . solid evidence of the ever-widening acceptance of M & C Edgar Paper Clays.

This item is starred on the coupon . . . check it.

Chart 1—Production of clay-containing papers

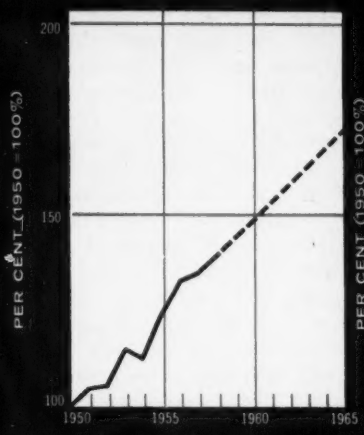
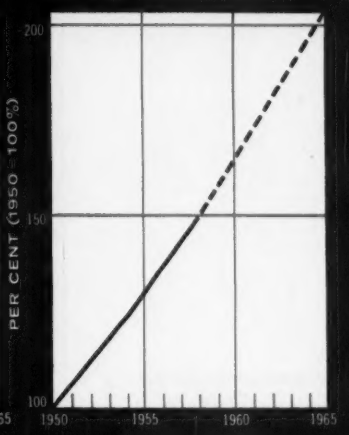
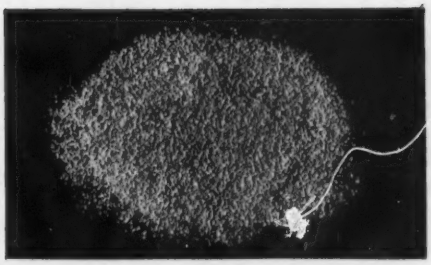


Chart 2—Storage capacity for M & C Edgar Paper Clays





Granular Herbicides do lasting weed-killing jobs . . . replace mowing and cultivation

Granular herbicides are another example of *chemicalization* to perform laborious, tedious jobs better. Rights of way for utilities and railroads, highways and turnpike roadsides, refinery and chemical plant tank farm and plant areas—all are being maintained with chemical weed killers in the manner developed for farm and orchard application.

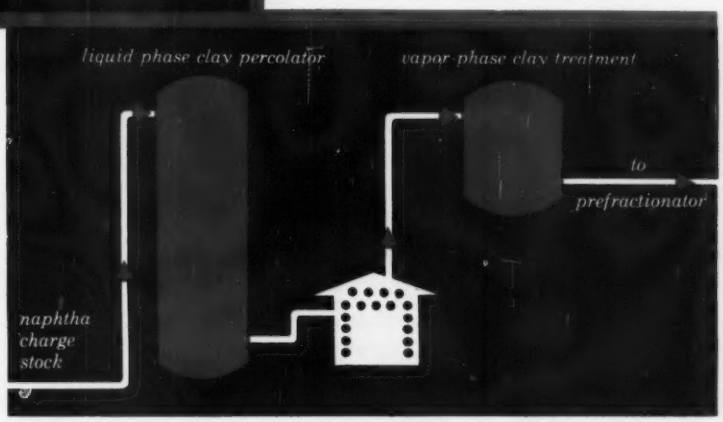
What makes granular herbicides so much better than other methods and formulations?

results obtained at *lower cost*
ease to produce, package, store, handle
less drift in application
fall-through to soil surface instead of adhering to leaves and other surfaces
flexibility in application methods

M & C's Granular Attaclay is the most widely used carrier material for these herbicides. The photo shows Attaclay 30/60 mesh (at quarter size). Attaclay's available in several size distributions to suit its jobs . . . look into it . . . use the coupon.

Platinum Catalysts protected against poisonous compounds with Attapulgus Clay adsorbents

Flow diagram shows reformer feed stock passing through Attapulgus Clay-packed "guard case" equipment where troublemaking constituents are removed by selective adsorption and catalysis. Some poisons need only be present at 10 *parts per billion* to permanently foul the catalysts. Low investment and prompt payout in terms of optimum production rate characterize this protective treating operation . . . poisons removed include Arsenic, Nitrogen, Tetraethyl Lead and Alkyl Sulfur compounds.



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✓ what you need to get tests started . . .
we'll fill your requests immediately.

For more data, see your 1959 Chemical Materials Catalog, Pages 192-196

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I'm interested in:
☐ * Reinforced Plastics Fillers; ☐ Attacote Conditioning Agent; ☐ * Edgar Paper Clays; ☐ Granular Herbicide Carriers; ☐ Platinum Catalyst Protection

Please send, without obligation:
☐ data; ☐ samples; ☐ prices; ☐ technical representative

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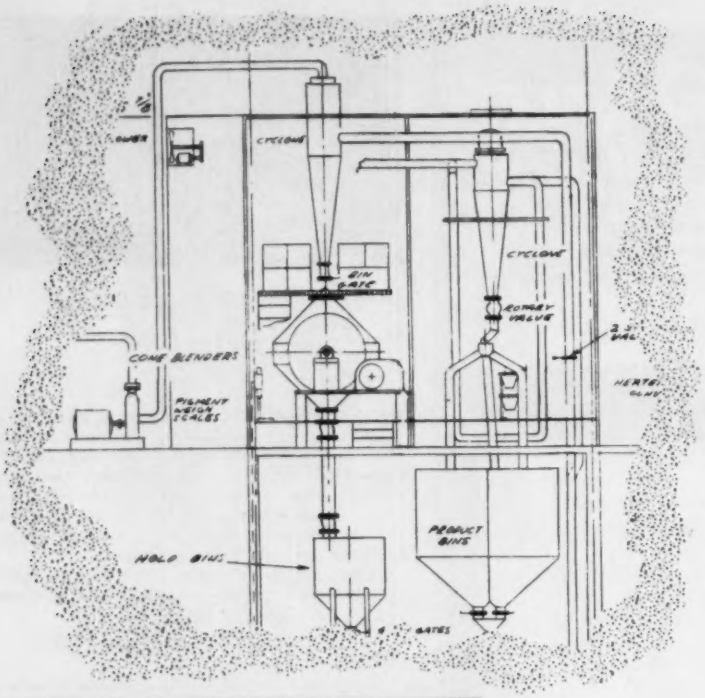
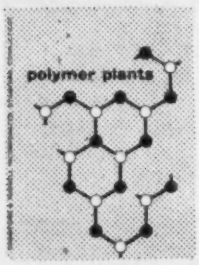


POLYMER
PLANT
ENGINEERING

Crawford & Russell has the largest technical staff specializing exclusively in designing and building complex polymer plants. We are now designing three multi-million dollar polymer plants, each the first of its kind, and many smaller units. We build pilot plants and special equipment. Our designs are original and advanced—our services are completely confidential.

Write for Bulletin 910



complete plants: RESINS • PLASTICS • SYNTHETIC RUBBERS

MONOMER → POLYMER → FINISHED PRODUCT
POWDER
PELLET
FILM
EXTRUSION
SOLUTION
EMULSION

SEE YOU AT THE CHEM SHOW
BOOTH 1000

CRAWFORD & RUSSELL
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695 SUMMER ST., STAMFORD, CONNECTICUT

ances are generally easy to find. And you can hear some excellent music at Town Hall, the Carnegie Recital and Carl Fischer Halls.

Where to Eat: A copy of *Cue* magazine or the *New Yorker* can be a big help to the out-of-town visitor in finding out what's doing in New York, where to eat and stay. As far as restaurants are concerned, Andrew Hepburn's "The Complete Guide to New York City" is first-rate, as is the newer "New York—Places and Pleasures" by Kate Simon, available in both paperback and hard-cover editions. Or, you might want to check your palate against the recent guide to New York in the October issue of *Holiday* magazine.

Where to Stay: It's hard for a visitor to go far wrong staying at a first-rate hotel in New York City. Most of them are accessible to theaters, restaurants and points of interest. A good rule, however, is to pick a hotel near the places you want to visit rather than close to the points of entrance to or exit from the city. For those primarily interested in the coliseum, the plush hotels along Central Park South (e.g., Essex House, Park Sheraton, Hampshire House) are just about ideal. But there are other good hotels (e.g., the Henry Hudson) that are about equally convenient.

Tips on Travel: Getting into New York or out of it is seldom a problem. Getting around it often is. In bad weather or during the rush hour in the evening (5-6 p.m.), finding a cab can be a problem. Moreover, getting cross-town (east-west) by cab when traffic is heavy can be little faster than walking. When traffic is very heavy (and it's likely to be during the Christmas shopping season), cabs can be of little help going north and south.

Buses are useful for short hops. But the best bet for getting around New York for long distances (20 blocks or more), especially in heavy traffic, is the subway. It's often difficult to get lucid directions. But maps are available at some newsstands and visitors bureaus, and are posted in each subway car and in the stations. It may take some time and effort to figure the maps out, but it will pay off in the long run. A novice, however, should not undertake to do this during rush hours in the morning or evening.

BRADY

HOW *Wirebound Composite Containers*

LIQUIDS

Newest RETURNABLES

For 5, 15, 30 and 55 Gallons

REPLACE STEEL DRUMS

The Newest members of the growing family of Wirebound Composite Containers for chemicals have already been approved for shipment with many regulated products. Note all except the 5 gallon size are octagonal in shape, and the 55 gallon size can have a built-in pallet base for fork lift handling. These economical, lightweight, chemical resistant packs do not rust, palletize well, and won't fail or deform when dropped. And you can stack them outdoors in any climate. Inner cylindrical polyethylene drums by Delaware Barrel & Drum Company.

inner polyethylene drum
by DELAWARE BARREL & DRUM CO.

Tear out and circulate or file

FOR REGULATED AND NON-REGULATED

PROVIDE MAXIMUM SAFETY, E

Wirebound Composite Containers are totally engineered packages, utilizing wood, steel, plastic and/or paper in specific amounts at particular places to obtain maximum serviceability at lowest cost. The outer shell can be prefabricated by many different Wirebound Container Manufacturers throughout the world; the inner component is available directly from various plastic fabricators.

For liquids, a full range of both returnable and expendable Wirebound Composite Containers are available in sizes to hold units from 16 oz. to 55 gallons. For granules and powders, bulk expendable Composite Containers—with built-in 4-way pallets—are in use carrying materials weighing up to one ton.

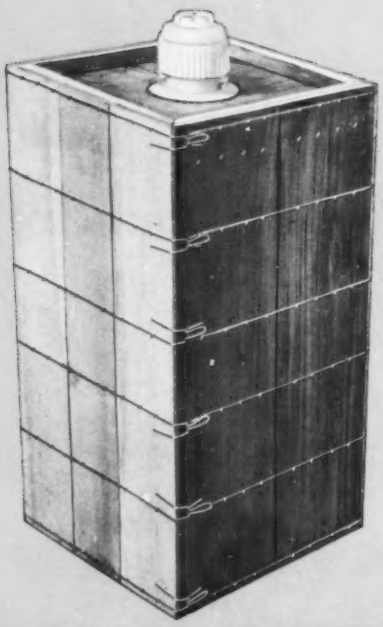
Besides the Wirebound Composite Containers shown on these pages, others—some with much larger capacities—are in various stages of development at Package Research Laboratory, Rockaway, N. J.

LIQUIDS

EXPENDABLES FOR 5 PT.,

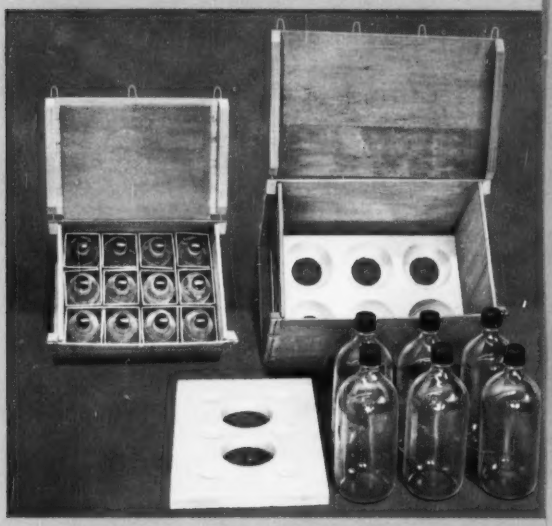
RETURNABLES FOR

This combination of
Wirebound jackets
than plywood combi
long lasting packag
including hydrochlo
non-regulated liquid



LIQUIDS; ALSO GRANULE

ECONOMY, CONVENIENCE

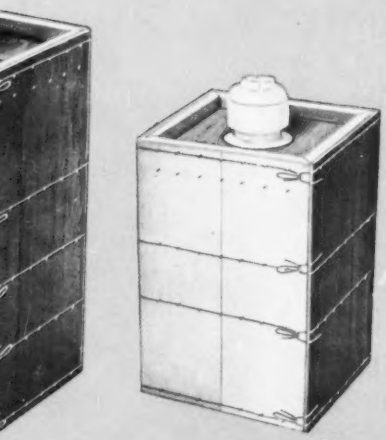


Approved for Nitric Acid and other regulated chemicals, these disposable packs for glass bottles utilize polystyrene interior packing in a strong Wirebound box. Besides being the *most economical* throw-away pack, they are lightweight, withstand unlimited high stacking, palletize and handle well and protect contents 100%.

PT., 16, 20 OZ. GLASS BOTTLES

FOR 13, 6½, 5 GAL.

n of Plax polyethylene carboys with outer kets results in low cost (reportedly ⅔ less ombinations); lightweight; easy handling; ackages for a wide range of products, ochloric acids and other corrosive and iquids.



MORE

LES & POWDERS

MORE ABOUT *Wirebound*

GRANULE AND POWDERS

EXPENDABLE 23 & 50 C

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Tear out and circulate or file

SEE THEM IN BOO

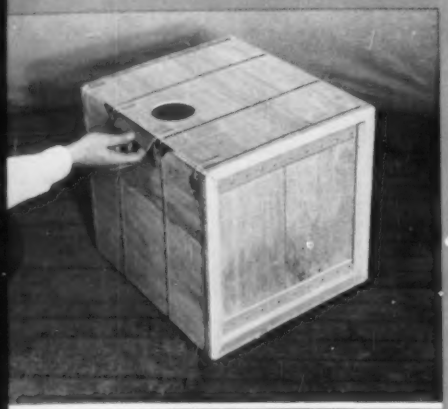
und Composite Containers

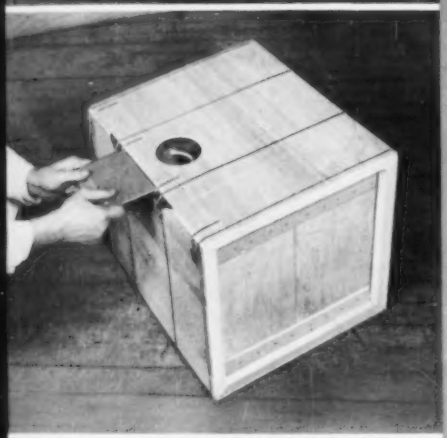
) CU. FT. BULK SHIPPERS

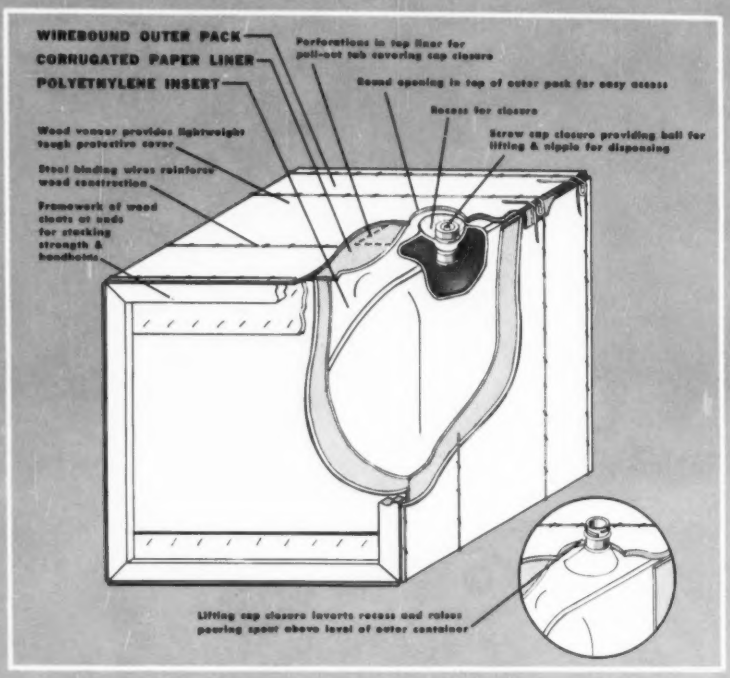
y carefully balancing the combination of xterior vertical wooden slats (for high tacking under all climatic conditions), hori- ontal interior wooden cleats (to resist the hrust of "cold flow"), corrugated fibre- oard (as a cheap covering material), steel inding wires (to reinforce all members, and o facilitate assembly), and an inner bag of olyethylene or Kraft paper (for moisture nd contamination protection), the resulting 'Wirebound Corrugated Bulk Containers" rovide an ideal, safe, disposable pack for granular or powdered material. Note the uilt-in, four-way pallet base—with 3⅝" clearance for a hand pallet truck, and the pace saving, rectangular shape. These ulk containers are assembled in 2 man inutes, generally require no capital in- estment.

OOTHS 1261 & 1263 AT

FOR MAXIMUM SAFETY, ECONOMY, CONVENIENCE






WIREBOUND OUTER PACK
CORRUGATED PAPER LINER
POLYETHYLENE INSERT
Perforations in top liner for pull-out tab covering cap closure
Round opening in top of outer pack for easy access
Recess for closure
Screw cap closure providing bail for lifting & nipple for dispensing
Wood veneer provides lightweight tough protective cover
Steel binding wires reinforce wood construction
Framework of wood cleats at ends for stacking strength & handholds
Lifting cap closure inverts recess and raises pouring spout above level of outer container

First EXPENDABLE FOR BULK LIQUIDS, THE 15 GAL. WIREBOUND CUBITAINER®

The popular one-trip, Wirebound Cubitainer, with unbreakable, semi-rigid molded insert by Hedwin Corporation, carries any liquid safe in polyethylene. Pull-out flap and retractable closure assure the ultimate in safety and convenience. Compared to a 13-gallon glass carboy packed in a nailed wooden case, the Wirebound Cubitainer costs 80% less, saves 80% in tare weight and requires less than half the usual storage space. It allows efficient palletizing, provides natural handholds at each end and withstands over 10,000 lbs. of stacking pressure—wet or dry.

®Cubitainer is the registered trademark of Hedwin Corp.

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Particle Size (Avg.), microns Width Thickness	 3 0.02	 5 0.02	 2.5 0.06	0.1*
Surface Area, sq. m/g	35	40	15	15
Oil Absorption, parts linseed oil/100 parts	180	160	80	20
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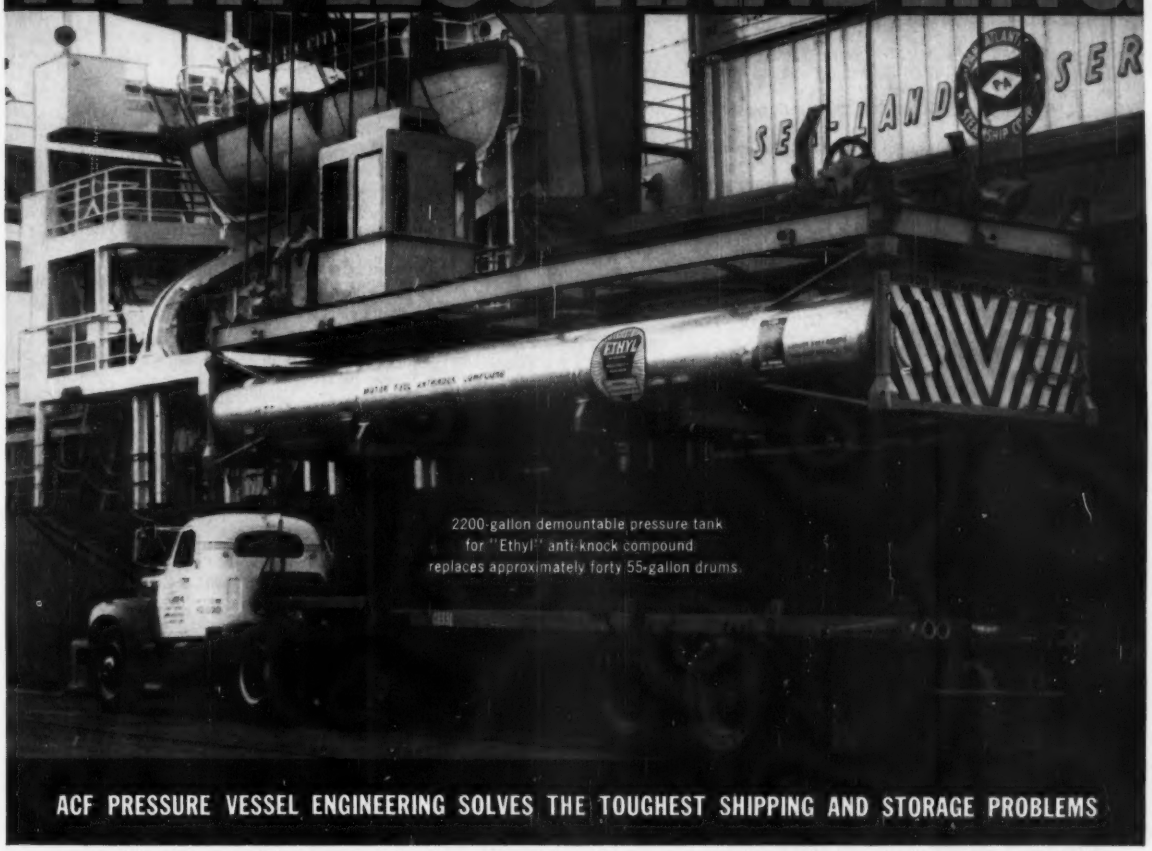

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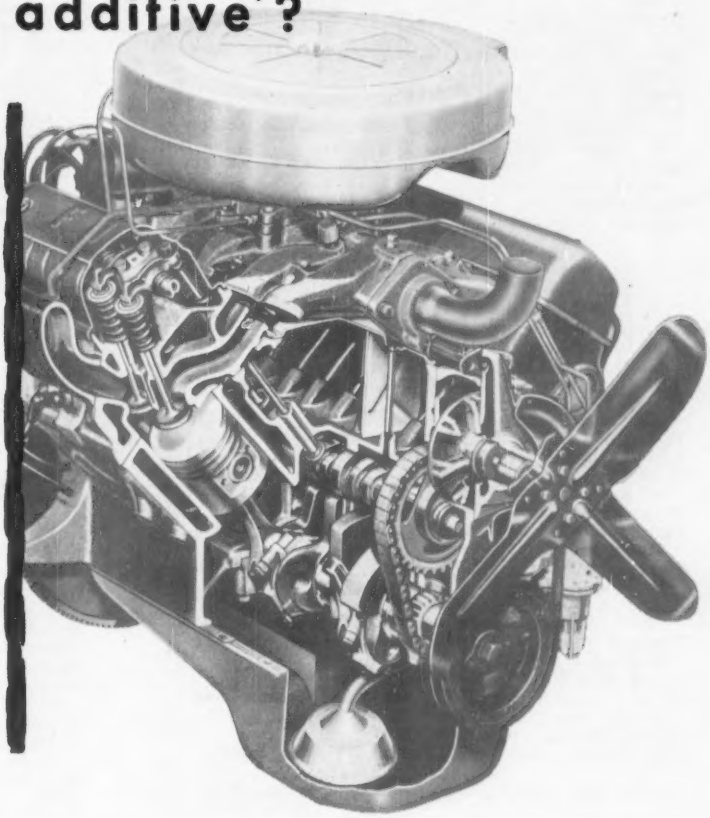

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Yuba Consolidated Industries, Inc., 1275 California Ave., Palo Alto, Calif. 882, 884, 886

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When it comes to deciding which supplier will give you consistently fast service one thing is certain: you've got to forget "as-the-crow-flies" geography and consider the actualities of railroad routing, interchanges and layovers.

If you make such an analysis, chances are, like many alkali buyers in the East, mid-South and Midwest, you'll see the wisdom of placing a good share of your business with Westvaco. Our strategic location at South Charleston, W. Va., often enables us to be in your plant faster than producers who are closer on the map.

If you want to know what we can do for you, call our nearest office today. We'll be happy to quote prices and *delivery time* right to your plant.

CAUSTIC SODA
Liquid 73%;
Liquid 50%, Regular and Low-Chloride Grades;
Flake, Solid and Ground.

CAUSTIC POTASH
45% and 50% Liquid;
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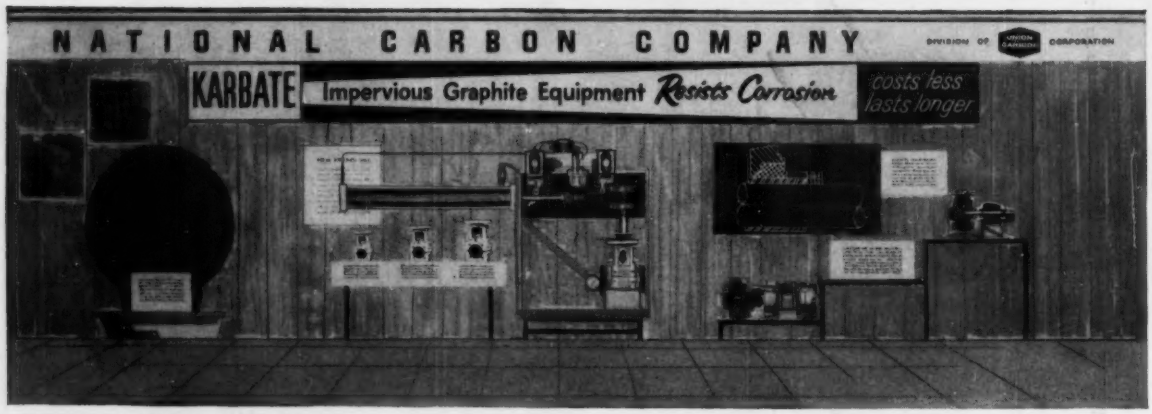
Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION
Westvaco Chlor-Alkali Division
General Sales Offices:
161 E. 42nd STREET, NEW YORK 17

News from
National Carbon Company
Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N. Y.
Sales Offices: Birmingham, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. IN CANADA: Union Carbide Canada Limited, Toronto

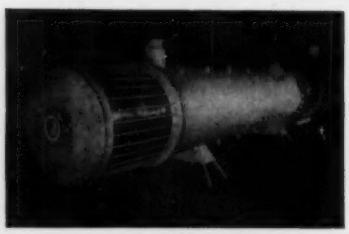
"CHEM SHOW" EXHIBIT SHOWS HOW "KARBATE" IMPERVIOUS GRAPHITE EQUIPMENT CUTS COSTS IN HANDLING CORROSIVES



NATIONAL CARBON COMPANY
BOOTH #490,
at the 1959 Chemical Industries Exposition
N. Y. COLISEUM,
NOV. 30th – DEC. 4th

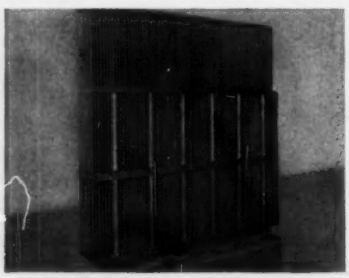
This year at the New York Coliseum you can see and talk about NATIONAL CARBON'S full line of "Karbate" impervious graphite process equipment.

Learn the latest facts about "Karbate" equipment performance in process services such as: *heat exchange, pumping, fluid conveying, and entrainment separating.* No other material can match the combination of *corrosion resistance, long life* and *low cost* you get with "Karbate" impervious graphite. Standardized designs assure fast delivery to speed plant conversion, replacement and expansion.



"KARBATE" HEAT EXCHANGERS PROVIDE MAXIMUM ECONOMY

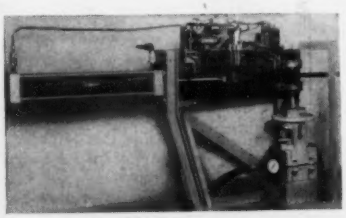
Planned replacement of metal heat exchangers in corrosive applications may cost more than using "Karbate" exchangers. "Karbate" impervious graphite shell and tube exchangers of standardized design are available with areas of from 17.7 to 3585 sq. ft. Prices range from $7.85 to $24.00 per sq. ft. See a 45" diameter cross-section of a typical exchanger at this year's exhibit in the *Chemical Industries Exposition.*



NEW MODULAR TYPE ENTRAINMENT SEPARATOR FOR LARGE INSTALLATIONS

The modular, Type MV, entrainment separator illustrated above is built from 1 by 2 ft. modules, which are easily assembled into banks to fit any duct or process vessel. "Karbate" separators are practically clog proof and are simple to clean when necessary. They operate with low pressure drops.

If you want to solve an entrainment pollution problem or recover a product from corrosive gas streams, see and ask about typical module installations at the Chemical Industries Exposition.



NEW "KARBATE" GLOBE VALVE

The "Karbate" Type G globe valve shown above undergoing life tests operates with low maintenance while handling corrosive solutions. This year's Chemical Industries Exhibit will show a "Karbate" valve being tested to prove its rugged dependability.

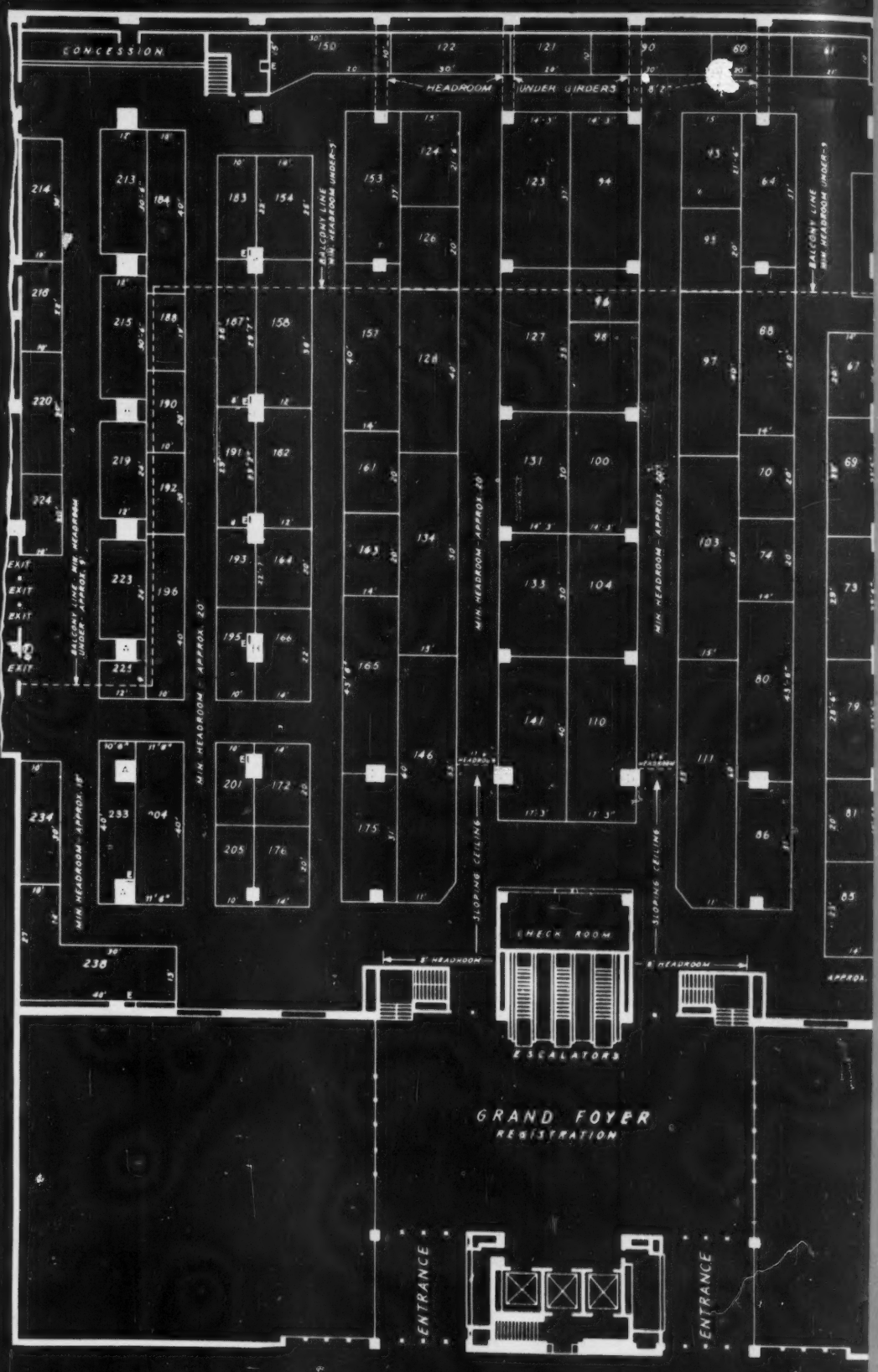
NATIONAL TRADE-MARK

"National", "Karbate", "N" and Shield Device and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

UNION CARBIDE

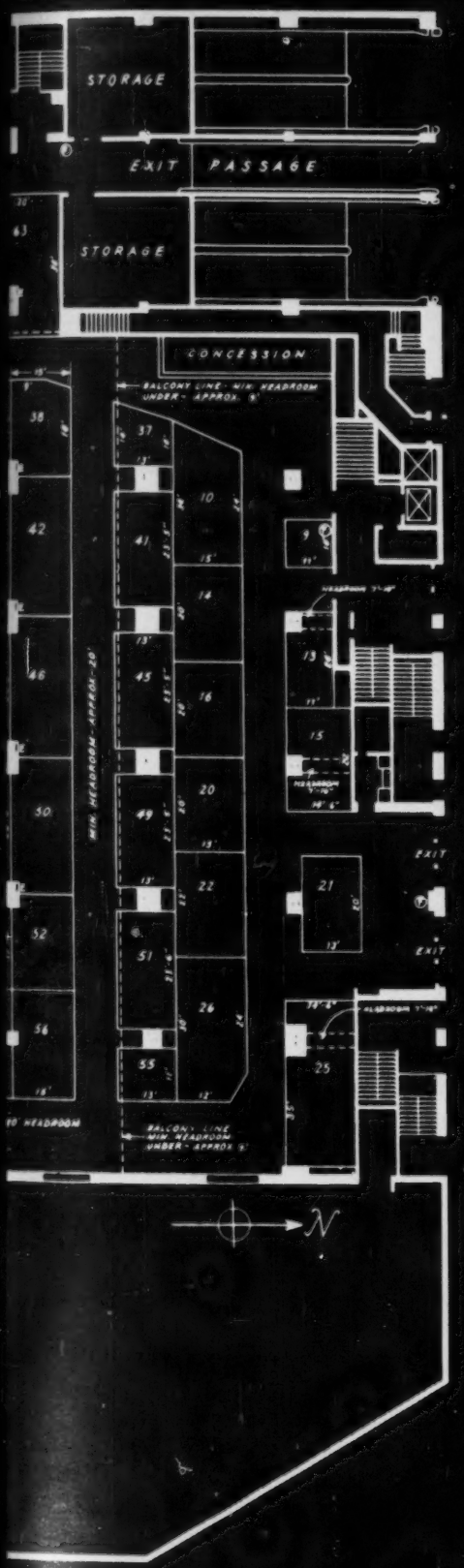
FINAL
CHEMSHOW
COVERAGE

WHERE



First Floor

E TO FIND THE EXHIBITORS AT THE CO



NEW YORK COLISEUM

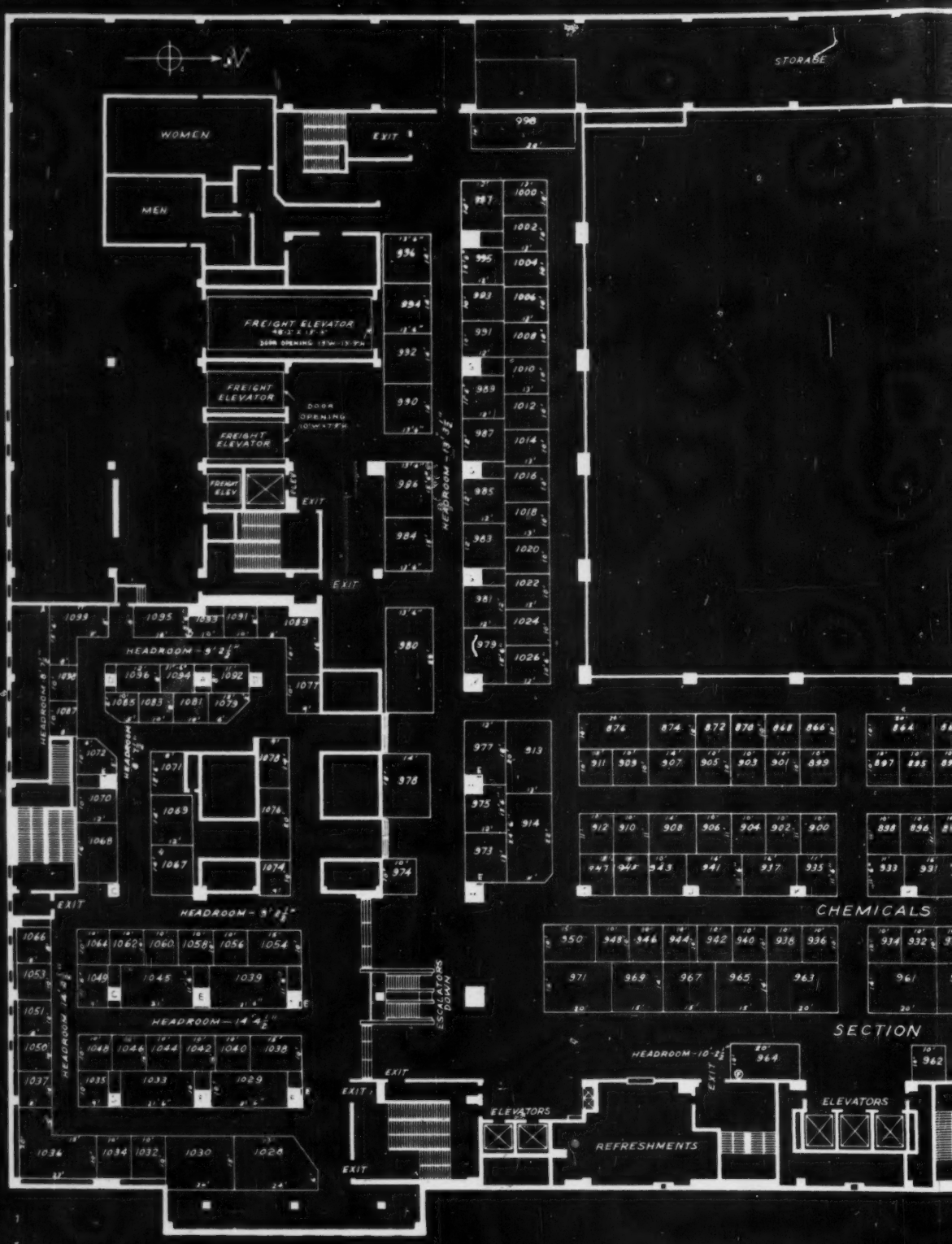
First Floor

SEUM

Second Floor

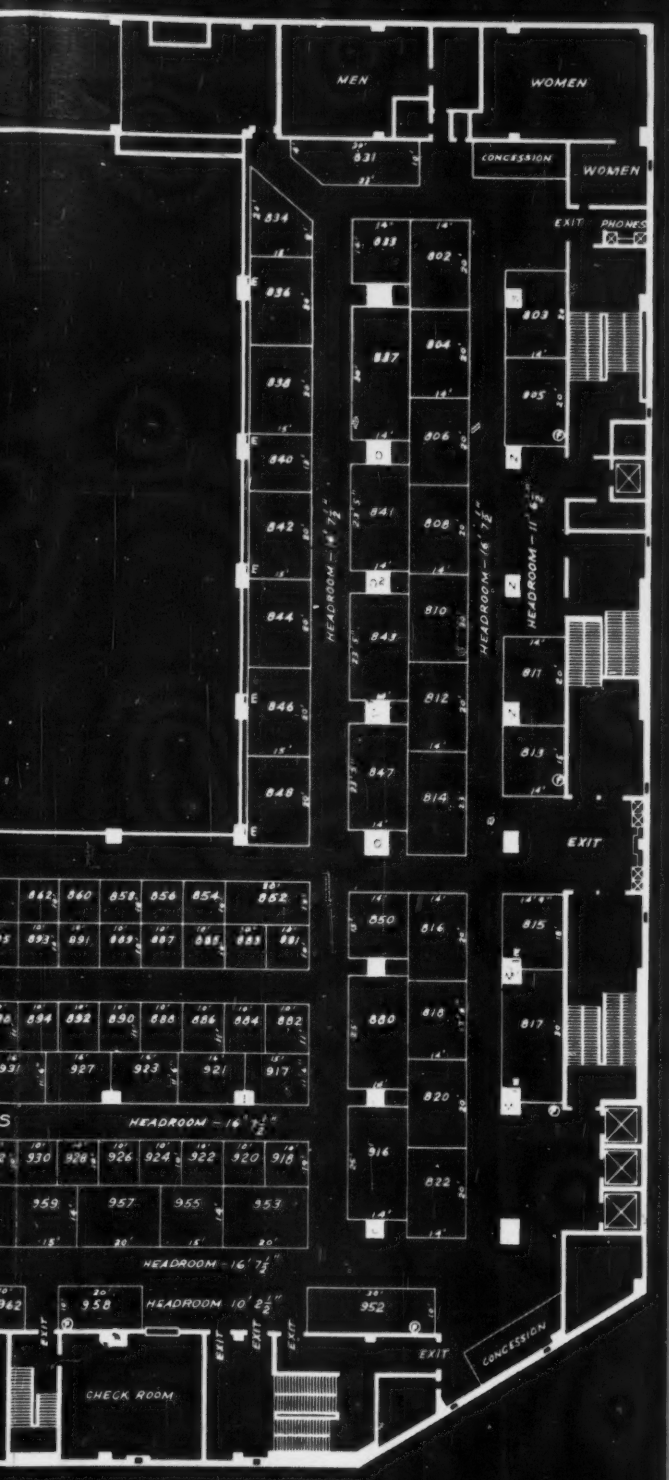
FINAL
CHEMSHOW
COVERAGE

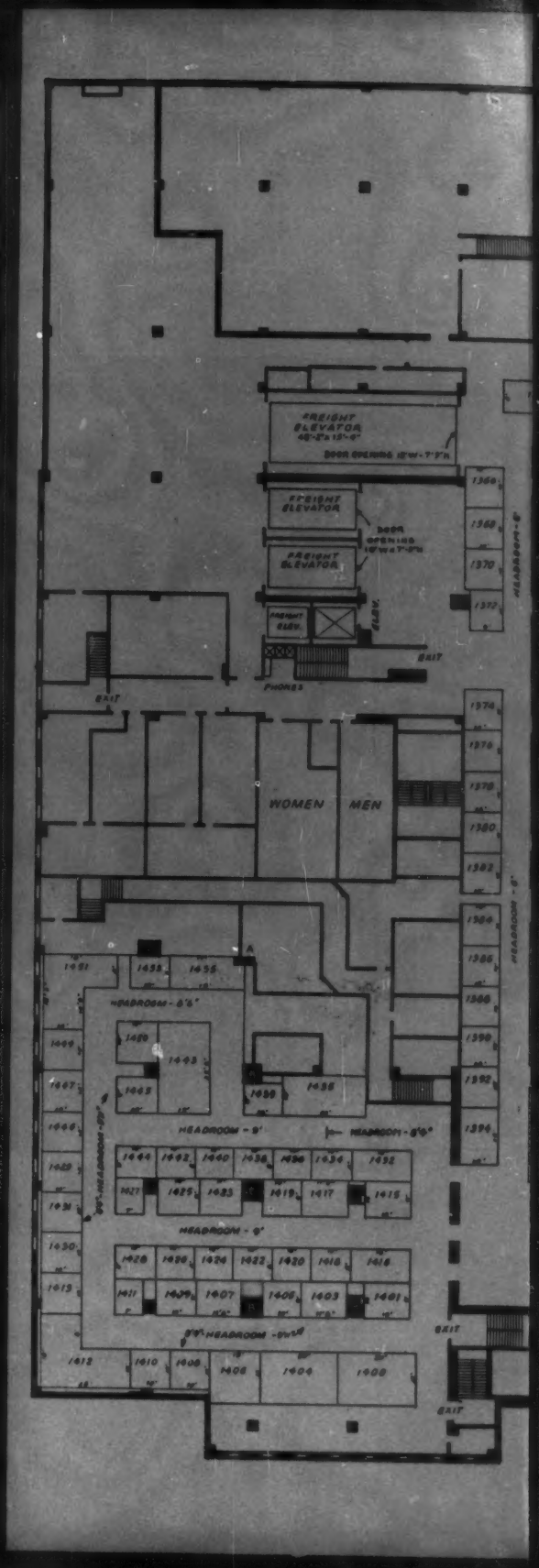
WHE



Third Floor

HERE TO FIND THE EXHIBITORS AT THE CO





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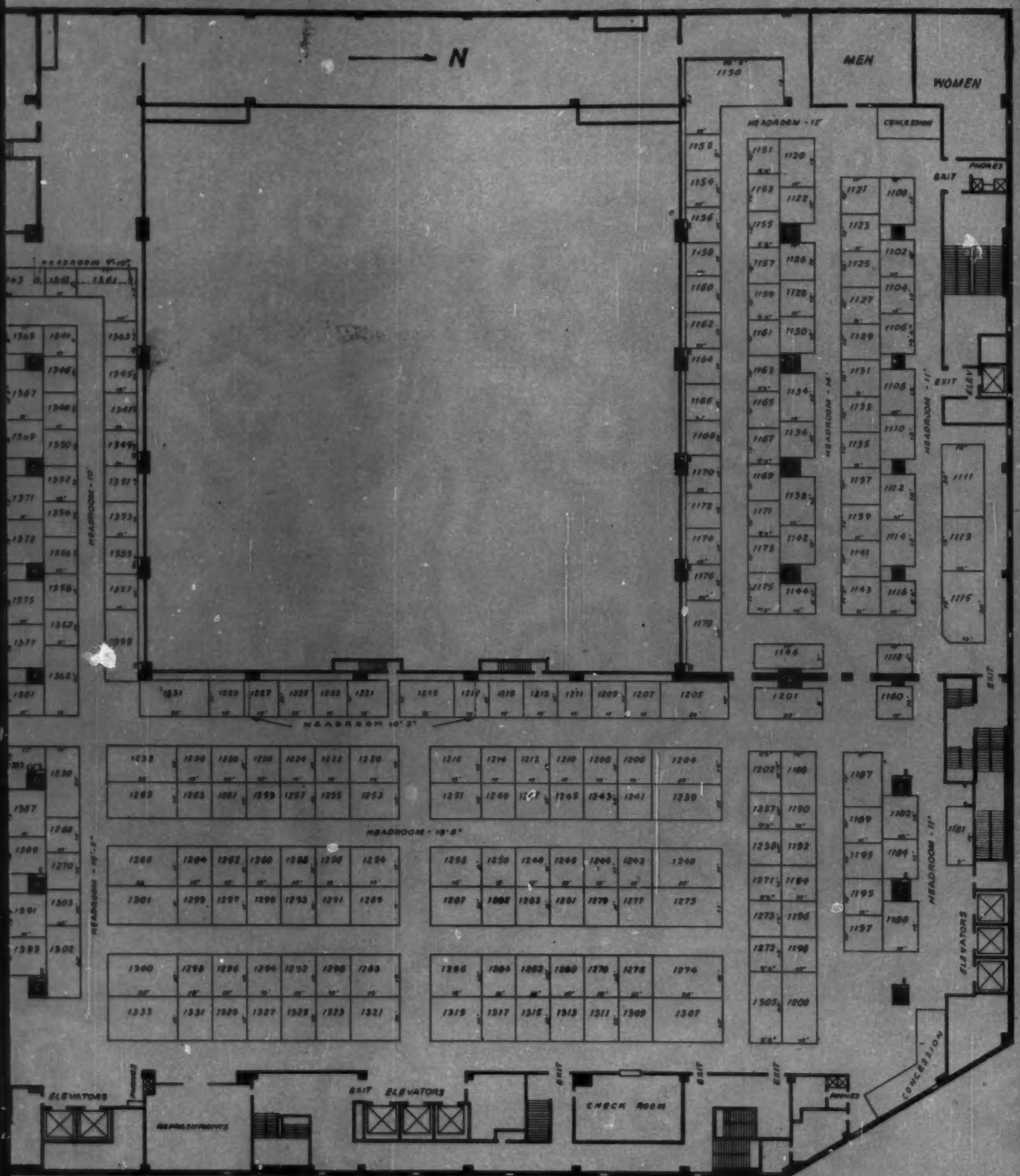
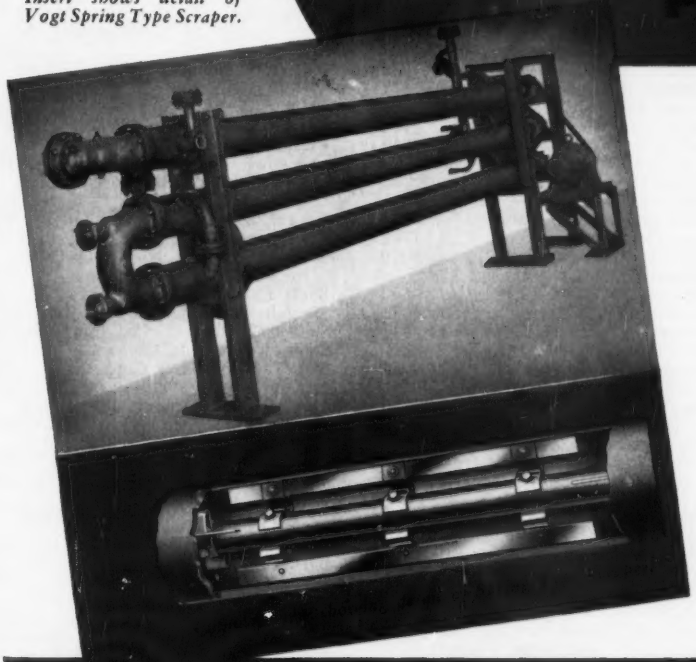


Fourth Floor

Vogt

SCRAPED SURFACE EXCHANGERS Solve these Special Heat Transfer and Crystallization Problems . . .

BELOW: *A scraped surface unit for production of Para-Xylene by fractional crystallization. Insert shows detail of Vogt Spring Type Scraper.*



. . . And Here's How:

1. Rotating scraper action continuously sweeps surfaces clean even while processing highly adhesive materials.
2. Uniform rate of heat transfer keeps crystallization under control and discharges crystals as a slurry.
3. Product is thoroughly mixed by scraper blades as it flows.
4. Closed, pressure-type system permits use of flammable, volatile and expensive solvents with complete safety and no solvent loss.
5. Units fabricated from a broad range of materials to suit process stream characteristics.

Write for Literature. Address Dept. 24A-XCW

Listed here is a wide variety of materials which have been successfully processed with Vogt Scraped Surface Exchangers in the chemical, petro-chemical, petroleum and related industries.

- Benzene Hexachloride
- Caustic Soda
- Caustic Potash
- Clay
- Cylinder Stock
- Para-Dichlorbenzene
- Fatty Acid Solutions
- Fish Oil
- Linseed Oil
- Naphthalene
- Paratone & Solids
- Phenolic Resins
- Polyester Liquid
- Pressed Distillate
- Reduced Petroleum
- Waxy Oil-Solvent Mix
- Soybean Oil
- Sperm Oil
- Sugar Syrup
- Sulfur-Oil Mix
- Sulphate Solution
- Tall Oil-Naphtha-Sulfuric Acid Solutions
- Tetrachloro Benzene
- Viscose
- Wax Slurry
- Para-Xylene

HENRY VOGT MACHINE CO.
Louisville 10, Ky.

Classified List of Exhibitors

27th Exposition of Chemical Industries

Coliseum, New York, N. Y., Nov. 30-Dec. 4, 1959

COMPANY — **BOOTH**

ABRASIVES

Allied Chemical Corp. 955-957-959-961
Norton Co. 1289-1291
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Peabody Engineering Corp. 1321
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Scientific Glass Apparatus Co., Inc. 332
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Allied Chemical Corp. 955-957-959-961
Armour Industrial Chemical Co. 932-934
Continental Oil Co. 930
Hercules Powder Co. 916
The Quaker Oats Co., Chemical Div. 953
Scientific Glass Apparatus Co., Inc. 332
U. S. Borax & Chemical Corp. 918-920
Victor Chemical Works 936-938-940-963

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Bemis Bros. Bag Co. 166-164
Eimco Corp. 80
Union Bag-Camp Paper Corp. 1296-1298

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New York Laboratory Supply Co. Inc. 1022
Scientific Glass Apparatus Co., Inc. 332
Tenso-Lab., Inc. 1123
Torsion Balance Co. 328
Welch Mfg. Co., W. M. 205

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Bel-Art Products 889
Binder Cooperage Co., Inc. 1127
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Delaware Barrel & Drum Co., Inc. 1187-1189-1193
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Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331

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Pennsylvania Fluorocarbon Co., Inc. 969
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Westinghouse Electric Corp. ... 510

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Gump Co., B. F. 1024-1026
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Fuller Co. 446
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Heil Process Equipment Corp ... 1305
Industrial Plastic Fabricators, Inc. 1102
Ingersoll-Rand Co. 128
International Process Equipment Co., Inc. 812
Niagara Blower Co. 655
Schutte and Koerting Co. 61
U. S. Hoffman Machinery Corp. 1365
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National-U. S. Radiator Corp. 850
Vogt Machine Co., Henry 124

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Eagle-Picher Co. 1167-1169
Harbison-Walker Refractories Co. 1241-1243

BOLTING CLOTH

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Great Western Mfg. Co. 216
Gump Co., B. F. 1024-1026
Lehmann Co., Inc., J. M. 1429-1431-1446
Multi-Metal Wire Cloth Co., Inc. 191
Newark Wire Cloth Co. 183
Simon-Carter Co. 1096
Southwestern Engineering Co. 1250-1252

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Namco Machinery, Inc. 365
Pfaudler Permutit, Inc. 110-141
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331

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Harbison-Walker Refractories Co. 1241-1243
Knapp Mills, Inc. 175
Knight Co., Maurice A. 586
National Carbon Co. 460-470
Nukem Products Corp. 1072
U. S. Stoneware Co. 111

BRICK, INSULATING

Harbison-Walker Refractories Co. 1241-1243
Norton Co. 1289-1291
Titanium Alloy Mfg. Div., National Lead Co. 234

BRICK REFACTORY

Harbison-Walker Refractories Co. 1241-1243
National Carbon Co. 468-470
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Carver, Inc., Fred S. 90
Colton Co., Arthur Div. Snyder Corp. 50
Fitzpatrick Co., W. J. & The Fitzpatco Corp. 64
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Bucket Elevator Co. 1038
Gifford Wood Co. 219
Great Western Mfg. Co. 216
Howes Co., Inc., S. 1029
Jeffrey Mfg. Co. 97
Kennedy-Van Saun Mfg. & Engr. Corp. 1036
Link-Belt Co. 165
M-H Standard Corp. 997
Rapids Machinery Co., Inc. 1162
Renneburg & Sons Co., Edw. 1078

BUILDING MATERIALS

Allied Chemical Corp. 955-957-959-961
Carey Mfg. Co., Philip 1152
Lead Industries Assn. 816
M-H Standard Corp. 997

BURNERS

American Gas Furnace Co. 833
Carlisle Gas Burner Corp. 1251
Eclipse Fuel Engineering Co. ... 973
General American Transportation Corp. 435-436-442-446-495
National-U. S. Radiator Corp. 850
Peabody Engineering Corp. 1321
Precision Scientific Co. 370-372
Renneburg & Sons Co., Edw. ... 1078
Schutte and Koerting Co. 61
Selas Corp. of America 979-981
Welch Mfg. Co., W. M. 205

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Browne-Morse Co. 1359
Duralab Equipment Corp. 359
Kewaunee Mfg. Co. 398
Laboratory Furniture Co. 309
Metalab Equipment Corp. Div. of Norbute Corp. 356
Protectoseal Co. 1286
Renneburg & Sons Co., Edw. ... 1078
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American Gas Furnace Co. 833
Bartlett & Snow Co., C. O. 569
Bowen Engineering, Inc. 706
Dorr-Oliver Inc. 531
General American Transportation Corp. 435-436-442-446-495
Kennedy-Van Saun Mfg. & Engrg. Corp. 1036
Nichols Engineering & Research Corp. 624
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. 850
Posey Iron Works, Inc. 1407
Renneburg & Sons Co., Edw. ... 1078
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New York Laboratory Supply Co., Inc. 1022
Scientific Glass Apparatus Co. 332
Tenso-Lab., Inc. 1123
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331
Welch Mfg. Co., W. M. 205

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Protectoseal Co. 1286
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CARBON

Barnebey-Cheney Co. 52
Falls Industries, Inc. 131
Filtros Inc. 854-856
Great Lakes Carbon Corp. Dicalite Dept. Electrode Div. 204
National Carbon Co. 460-470
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Ampco Metal, Inc. 412
Crane Co. 422
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Kennedy-Van Saun Mfg. & Engrg. Corp. 1036
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CATALYSTS

Aluminum Company of America .. 559
Allied Chemical Corp. 955-957-959-961
Barnebey-Cheney Co. 52
Catalytic Combustion Corp. 1209
Eagle-Picher Co. 1167-1169
Engelhard Industries, Inc. ... 192-196
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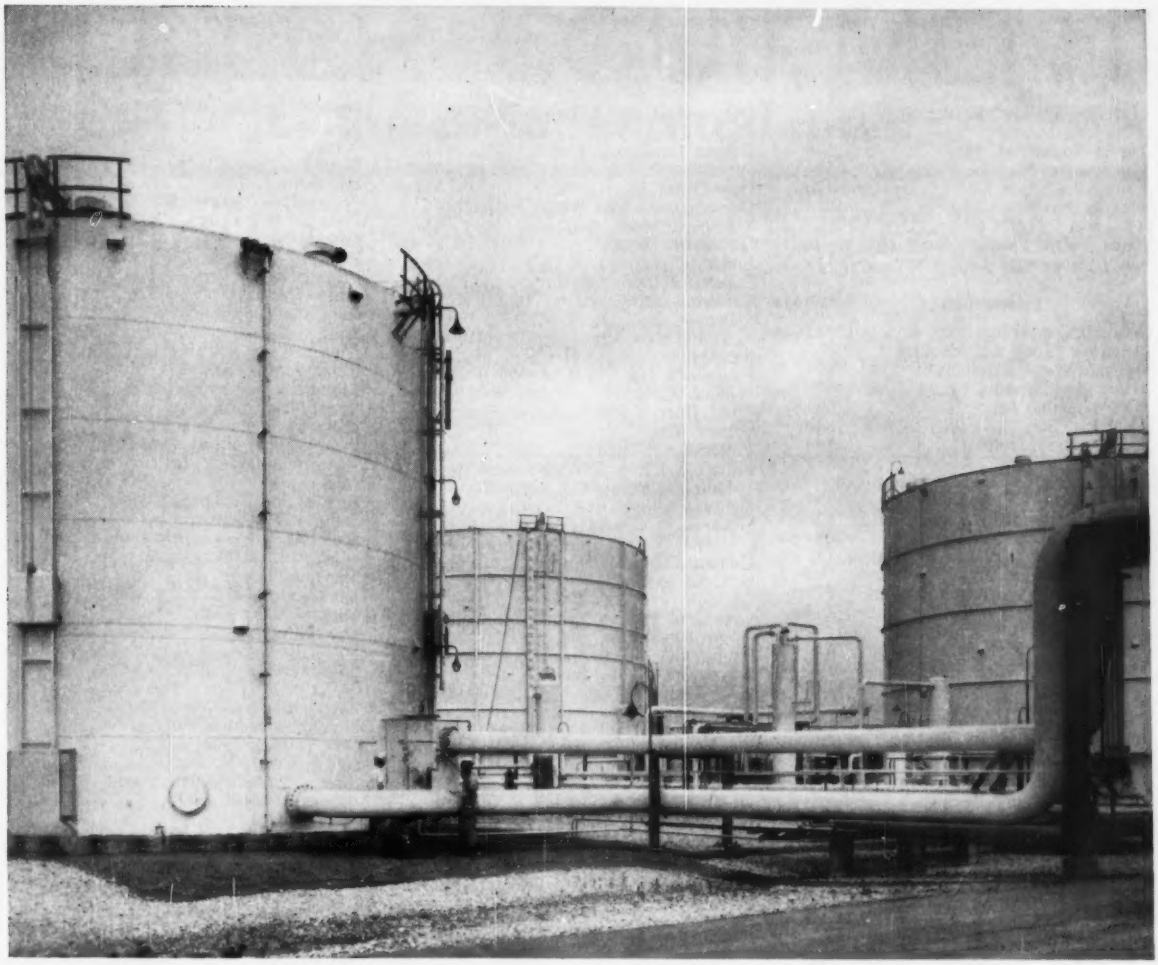
Aluminum Company of America .559
Carey Mfg. Co., Philip 1152
Eagle-Picher Co. 1167-1169
Fibercast Co. Div., Youngstown Sheet & Tube Co. 870



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Nukem Products Corp. 1072
Thermon Mfg. Co. 1207
Tube Turns Plastics, Inc. 96
U. S. Stoneware Co., The 111

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Alsop Engineering Corp. 381
American Tool and Machine Co. 862
Artisan Metal Products 874
Baker Perkins, Inc. 560 & 609
Bird Machine Co. 685
Centrico, Inc. 842
De Laval Separator Co. 94
Dorr-Oliver Inc. 531
Entoleter Div., Safety Industries Inc. 1599
General Laboratory Supply Co. 310
Miller Products Co. Inc. 1091
Pfaudler Permutit, Inc. 110 & 141
Podbielniak, Inc. 595
Renneburg & Sons Co., Edw. 1078
Sharples Corp. 485
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Bucket Elevator Co. 1038
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Podbielniak, Inc. 595
Porter Inc., George K. 1134-1136
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Pressure Products Co. 1409
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Read Standard Div., Capitol Products Corp. 162
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Ross & Son Co., Inc., Charles 983-985
Schutte & Koerting Co. 61
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Sharples Corp. 485
Sier-Bath Gear & Pump Co., Inc. 806
Simon-Carter Co. 1096
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Southwestern Engineering Co. 1250-1252
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Wilmot Castle Co. 1033
York Co., Inc., Otto H. 85
Yeomans Brothers Co. 1156
Young Machinery Co., Inc., The 1087
Young Radiator Co. 1403
Yuba Consolidated Industries, Inc. 882-884-886

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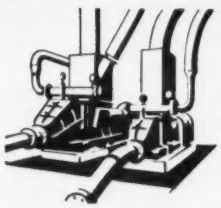
General Ceramics Corp. 131
Knight Co., Maurice A. 586
New York Laboratory Supply Co., Inc. 1022
Scientific Glass Apparatus Co., Inc. 332

CHEMICALS, INDUSTRIAL

Allied Chemical Corp. 955-957-959-961
Aluminum Company of America 559
Ansul Chemical Co. 95
Armour Industrial Chemical Co. 932-934
Bishop & Co., Platinum Works, J. 900-902
Chemo Puro Mfg. Co. 962
Cobalt Information Center c/o Battelle Memorial Institute 1415

FULLER EQUIPMENT

for the process industries



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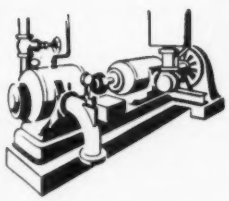

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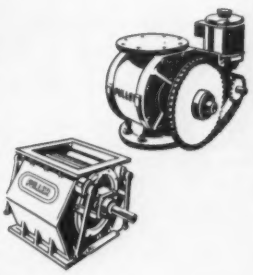

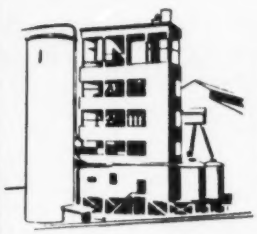

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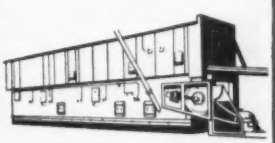

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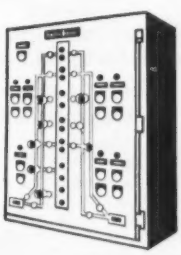

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Michigan Chemical Corp. 942
Minerals & Chemicals Corp. of America 950
National Rosin Oil Products, Inc. 917
Quaker Oats Co., Chemicals Div. 953
Scientific Glass Apparatus Co., Inc. 332
Titanium Alloy Mfg. Div., National Lead Co. 234
U. S. Borax & Chemical Corp. 918-920
Victor Chemical Works 936-938-940-963
West Virginia Pulp & Paper Co., Industrial Chemical Sales Div. 924-926

CHEMICALS, LABORATORY

Allied Chemical Corp. 955-957-959-961
Ansul Chemical Co. 95
Bishop & Co., Platinum Works, J. 900-902
Engelhard Industries, Inc. 192-196
General Laboratory Supply Co. 310
Metal Hydrides Inc. 964
Metalsalts Corp. 933
Michigan Chemical Corp. 942
New York Laboratory Supply Co., Inc. 1022
Scientific Glass Apparatus Co., Inc. 332
Tenso-Lab., Inc. 1123
Welch Mfg. Co., W. M. 205

CHEMICALS, PHARMACEUTICAL

Allied Chemical Corp. 955-957-959-961
Ansul Chemical Co. 95
Bishop & Co., Platinum Works, J. 900-902
Chemo Puro Mfg. Co. 962
Engelhard Industries, Inc. 192-196
Metal Hydrides Incorporated 964
Metalsalts Corp. 933
Michigan Chemical Corp. 942
Minerals & Chemicals Corp. of America 950
Scientific Glass Apparatus Co., Inc. 332
Victor Chemical Works 936-938-940-963

CHEMISTS

Allied Chemical Corp. 955-957-959-961
Laboratory Equipment Corp. 905

CHLORINATORS

B-I-F Industries, Inc. 660
Cornell Machine Co. 1212
Fischer & Porter Co. 496
Glascote Products, Inc. 596
National Carbon Co. 460-470
Norcross Companies, Sterling E. 991
Wallace & Tiernan Inc. 686

CLARIFIERS

Alsop Engineering Corp. 381
American Tool & Machine Co. 862
Bird Machine Co. 685
Brown & Co., J. G. 1093
Centrico, Inc. 842
Chain-Belt Co. 1416
De Laval Separator Co. 94
Denver Equipment Co. 1146
Dorr-Oliver Inc. 531
Eimco Corp. 80
Filterite Corp. 1303
Hardinge Co., Inc. 582
Hungerford & Terry, Inc. 1164-1166
Minerals & Chemicals Corp. of America 950
Pfaudler Permutit, Inc. 110 & 141
Podbielniak, Inc. 595
Premier Mill Corp. 1391
Sharples Corp. 485
Yeomans Brothers Co. 1156

CLASSIFIERS

Alpine American Corp. 1432-1434
American Tool & Machine Co. 862
Bird Machine Co. 685
Buell Engineering Co., Inc. 1204
Coulter Industrial Sales Co. 1444
Denver Equipment Co. 1146
Dorr-Oliver Inc. 531
Hardinge Co., Inc. 582
Howes Co., Inc., S. 1029
Kennedy-Van Saun Mfg. & Engrg. Corp. 1036
Nichols Engineering & Research Co. 624
NoVo Div., Industrial Enterprises, Inc. 1030
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Sharples Corp. 485
Southwestern Engineering Co. 1250-1252
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Toledo Scale 157
Worthington Corp. 545

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Allied Chemical Corp. 955-957-959-961
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Heil Process Equipment Corp. 1305
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International Nickel Co., Inc. 509
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Knight Co., Maurice A. 586
Lead Industries Assn. 816
Metal Cladding, Inc. 1378
Nukem Products Corp. 1072
Pfaudler Permutit, Inc. 110 & 141
Titanium Alloy Mfg. Div., National Lead Co. 234
U.S. Stoneware Co. 111

COILS

Bishop & Co., Platinum Works, J. 900-902
Dean Products, Inc. 184
Drayer Hanson Div., National-U.S. Radiator Corp. 850
Fansteel Metallurgical Corp. 617
Frick Co. 1258-1260
Haynes Stellite Co., Div. of Union Carbide Corp. 460-470
Heat Transfer Div., National-U.S. Radiator Corp. 850
Knapp Mills, Inc. 175
National-U.S. Radiator Corp. 850
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Day Co. 45
Dustex Corp. 1299-1301
Fluid Energy Processing & Equipment Co. 813
Fuller Co. 446
Industrial Products Engineering Co. 1259
Jeffrey Mfg. Co. 97
National Dust Collector Corp. 695
Peabody Engineering Corp. 1321
Renneburg & Sons Co., Edw. 1078
Schutz-O'Neill Co. 1028
Sly Mfg. Co., W. W. 73
Southwestern Engineering Co. 1250-1252
Western Precipitation Corp. 1181
Wheelabrator Corp. 190
Young Machinery Co., Inc., The 1087

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Chemicolloid Laboratories, Inc. 618
Day Co., J. H. Div., Cleveland Automatic Machine Co. 121-122
Denver Equipment Co. 1146
Fitzpatrick Co., W. J. & Fitzpatco Corp. 64
Gifford-Wood Co. 219
Industrial Products Engineering Co. 1259
Manton-Gaulin Mfg. Co., Inc. 51
Morehouse-Cowles, Inc. 814
Premier Mill Corp. 1391
Ross & Son Co., Inc., Charles 983-985
Scientific Glass Apparatus Co., Inc. 332
Sonic Engineering Corp. 1122
Tri-Homo Corp. 214

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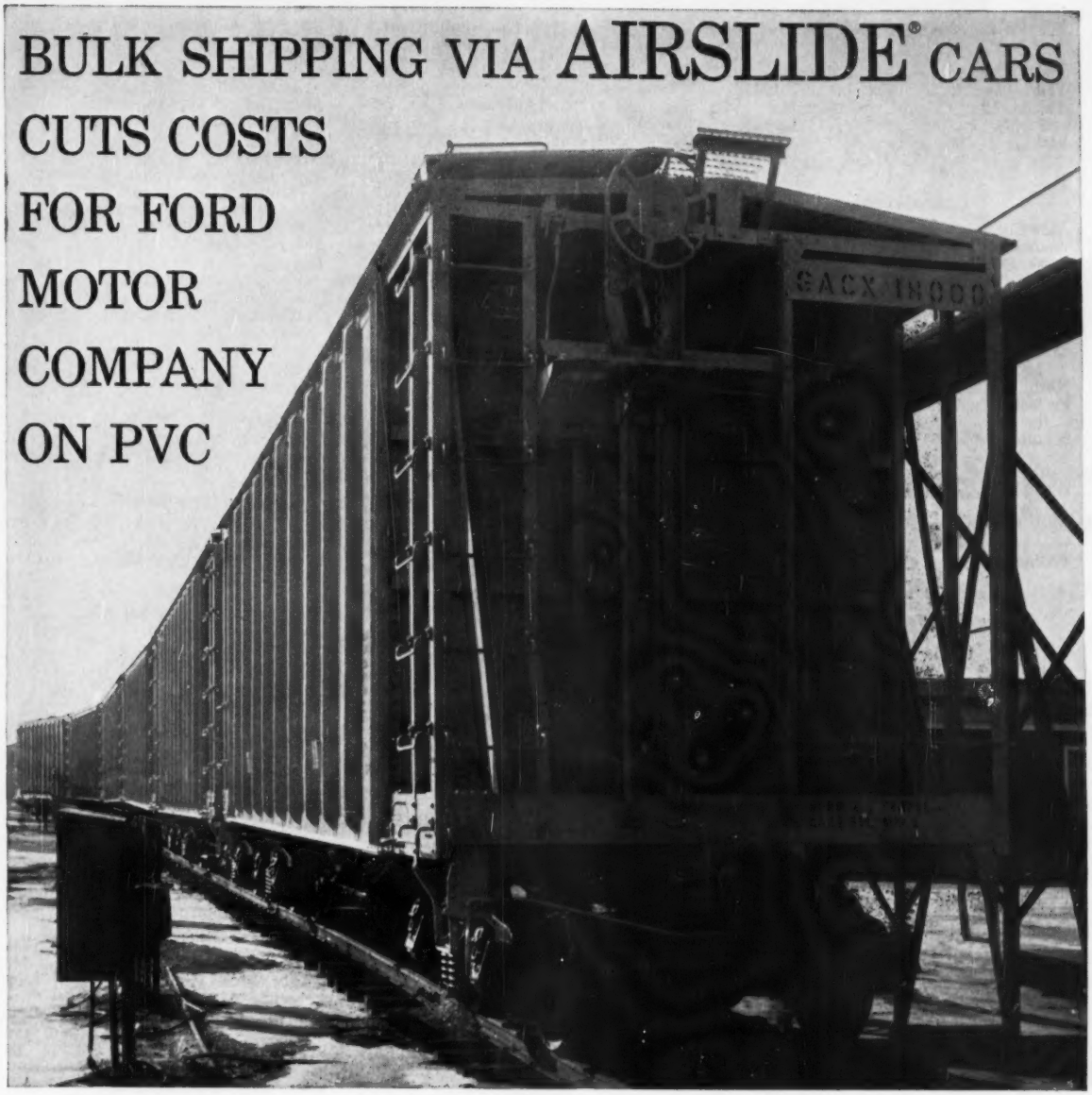
Beckman Instruments, Inc., Scientific & Process Instruments Div. 333
Coleman Instruments, Inc. 320
General Laboratory Supply Co. 310
Milton Roy Co. 610
New York Laboratory Supply Co., Inc. 1012
Photovolt Corp. 389
Precision Scientific Co. 370-372
Scientific Glass Apparatus Co., Inc. 332
Tenso-Lab, Inc. 1123
Welch Mfg. Co., W. M. 205

COMPARATORS

General Laboratory Supply Co., Inc. 310
Scientific Glass Apparatus Co., Inc. 332

BULK SHIPPING VIA AIRSLIDE® CARS CUTS COSTS FOR FORD MOTOR COMPANY ON PVC



Producing a better car for the least possible money is a constant challenge to auto manufacturers. To help solve this problem the Ford Motor Company is cutting costs of transporting PVC resin by bulk shipping in Airslide cars.

As a result, Ford not only gets substantial savings, but receives the PVC without in-transit contamination.

The Airslide car is filled by blowing the resin through one of the top hatches of the car. At the unloading point, low pressure air is used to aerate the PVC and cause it to discharge by gravity. The product is then taken under vacuum through a pipe to storage bins.

If you ship or receive dry granular chemicals in bulk, investigate the advantages of shipping via Airslide car. You'll find *it pays to plan with General American.*

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Frick Co. 1258-1260
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MacIntosh Equipment Corp. 1343-45-47-49
Nash Engineering Co. 238
Pressure Products Industries, Inc. 1367-1369
Schutte and Koerting Co. 61
Scientific Glass Apparatus Co., Inc. 332
U.S. Hoffman Machinery Corp., Air Appliance Div. 1265
Voss Co., Inc., J. H. H. 1224
Worthington Corp. 545
Yeomans Brothers Co. 1156

CONCENTRATORS

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Croll-Reynolds Engineering Co., Inc. 1054
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Distillation Engineering Co. 1048
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Falls Industries, Inc. 131
Fansteel Metallurgical Corp. 617
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Heat Transfer Div., National-U.S. Radiator Corp. 850
Ingersoll-Rand Co. 128
Kimble Glass Co. 390
Mazzoni, G., S. P. A. 1412
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National-U.S. Radiator Corp. 850
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Porter Inc., George K. 1134-1136
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Schutte and Koerting Co. 61
Scientific Glass Apparatus Co., Inc. 332
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Star Tank & Filter Corp. 233
Vogt Machine Co., Henry 124
Welch Mfg. Co., W. M. 205
Westinghouse Electric Corp. 510
Worthington Corp. 545
Young Radiator Co. 1403
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Allis-Chalmers Mfg. Co. 636
Automatic Switch Co. 847
General American Transportation Corp. 435-436-442-446-495
Knight Co., Maurice A. 586
Mixing Equipment Co., Inc. 146
Podbielniak, Inc. 595
Westinghouse Electric Corp. 510
Yeomans Brothers Co. 1156

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Alloy Products Corp. 1205
Aluminum Company of America 559
Associated Cooperage Industries of America, Inc. 898
Binder Cooperage Co., Inc. 1127
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Delaware Barrel & Drum Co., Inc. 1187-1189-1193
Greif Bros. Cooperage Corp. 41
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Package Research Laboratory. 1261-1263
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Protectoseal Co. 1286
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Sprout, Waldron & Co., Inc. 846-848
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United Box & Lumber Co. 1085

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Barber-Colman Co., Wheelco Instruments Div. 395
Beckman Instruments, Inc., Scientific & Process Instruments Div. 333
Brooks Rotameter Co. 998
Coulter Industrial Sales Co. 1444
Edison Industries, T. A., Instrument Div., Mc-Graw-Edison Co. 945
Falcon Alarm Co. 1343-1345-1347-1349
Fike Metal Products Corp. 1427
Fischer & Porter Co. 496
Flow-Actuated Control Co. 1343-1345-1347-1349
Foxboro Co., The 519
Frick Co. 1258-1260
Fuller Co. 446
Fulton Sylphon Div., Robertshaw-Fulton Controls Co. 1293
Gems Co. 1343-1345-1347-1349
General Electric Co. 482
Jacoby-Tarbox Corp. 1362
Jarco Services, Inc. 1343-1345-1347-1349
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Magnetrol, Inc. 910-912
Mine Safety Appliances Co. 14-16
Minneapolis-Honeywell Regulator Co. 635
Norcross Corp. 443
Precision Thermometer & Instrument Co. 1401
Pressure Products Industries, Inc. 1367-1369
Seavy & Sons, M. J 1071
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Taylor Instrument Companies 104
Tenso-Lab., Inc. 1123
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331
Thermo Electric Co., Inc. 817
Trerice Co., H. O. 1287
Warrick, Charles F., Co. 1343-1345-1347-1349
Welch Mfg. Co., W. M. 205
Westinghouse Electric Corp. 510

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Allis-Chalmers Mfg. Co. 636
Automatic Switch Co. 847
Barber-Colman Co., Wheelco Instruments Div. 395
B-I-F Industries, Inc. 660
Black, Sivalls & Bryson, Inc. 669
Brooks Rotameter Co. 998
Burling Instrument Co. 9
Distillation Engineering Co. 1048
Falcon Alarm Co. 1343-45-47-49
Fischer & Porter Co. 496
Flow Actuated Control Co. 1343-45-47-49
Foxboro Co., The 519
Fulton Sylphon Div., Robertshaw-Fulton Controls Co. 1293
Gems Co. 1343-45-47-49
Hastings-Raydist, Inc. 1020
Industrial Nucleonics Corp. 1418-1420
Jarco Services, Inc. 1343-45-47-49
Leslie Co. 1333
Magnetrol, Inc. 910-912
Mettler Instrument Corp. 339
Minneapolis-Honeywell Regulator Co. 635
Norcross Corp. 443
RKL Controls, Inc. 1405
Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div. 1366-1368
Rockwell Mfg. Co. 69
Seavy & Sons, M. J. 1071
Selas Corp. of America 979-981
Strong, Carlisle & Hammond 1121
Superior Electric Co. 804
Taylor Instrument Companies 104
Thermo Electric Co., Inc. 817
Warrick Co., Charles F. 1343-45-47-49
Westinghouse Electric Corp. 510

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Dracco Div., Fuller Co. 495
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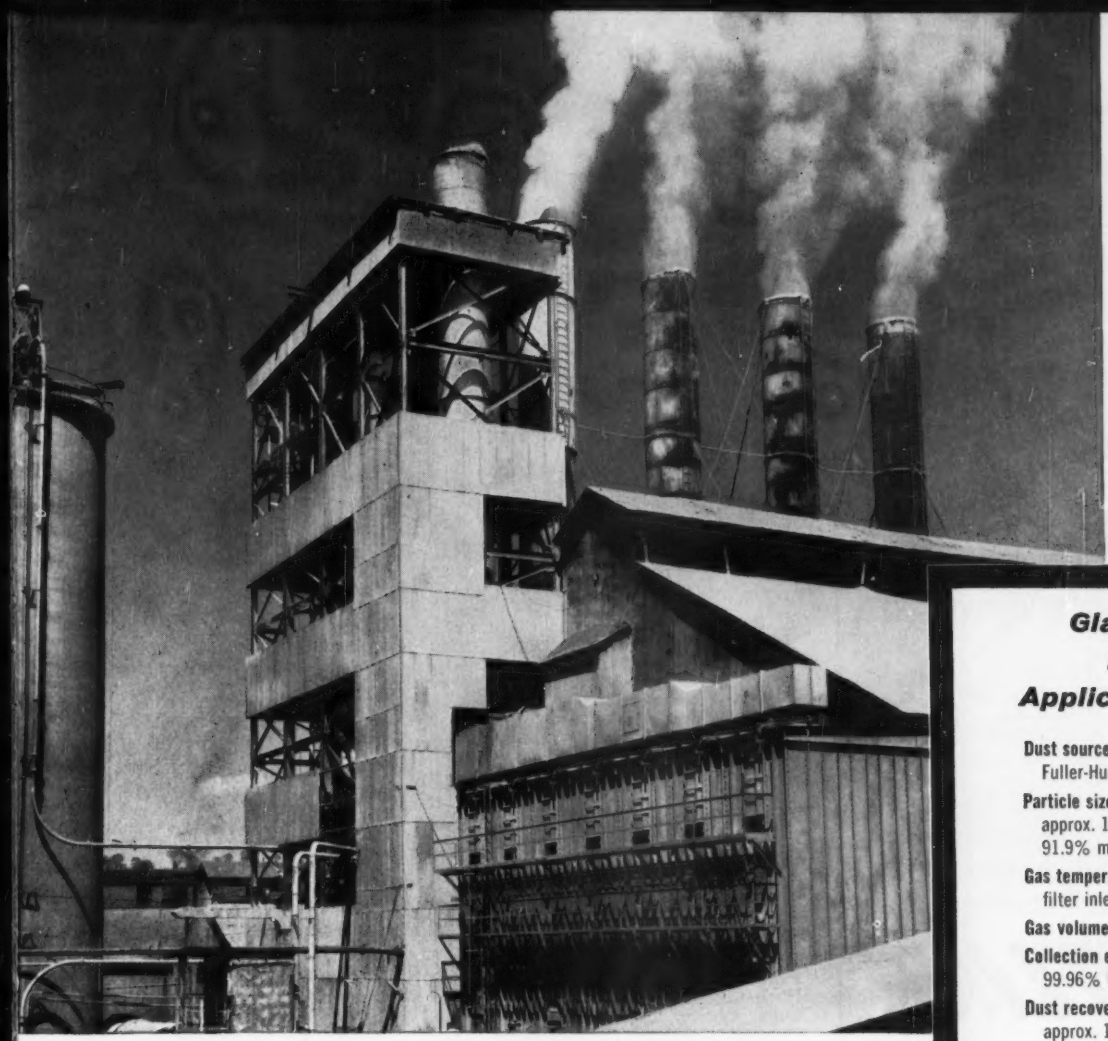
General American Transportation Corp. 435-436-442-446-495
Gifford Wood Co. 219
Great Western Mfg. Co. 216
Hapman Conveyors, Inc. 1358



Glass-Bag Filter Application Data:

Dust source: cement kiln with Fuller-Humbolt preheater

Particle size:
approx. 100% minus 10 microns
91.9% minus 5 microns

Gas temperature:
filter inlet: 570-600° F.

Gas volume: 42,000 cfm

Collection efficiency:
99.96% by weight

Dust recovery rate:
approx. 1 ton/hour

Filter size: 7 compartments, 48 fiber glass bags per compartment

Bag cleaning method:
SONOCLEAN

Dracco Glass-Bag Filter stops air pollution

The unretouched photograph shows the kiln stacks at an eastern cement plant. *All five kilns are operating!* One stack is clean because a Dracco Glass-Bag Filter is removing all visible dust from the hot kiln exhaust gas.

Results like this have made Dracco Glass-Bag Filters industry's most effective weapon against air pollution.

New performance standard

Previously the hot kiln gases would have made this an "impossible" job for a cloth bag collector. But fiber glass cloth filters, pioneered by Dracco, can collect hot, corrosive dust and fumes to 600° F. at virtually 100% efficiency.

This radically better dust collector is now available to solve the toughest air pollution problems: cement kilns, calciners, metallurgical furnaces, power boilers, chemical processes, cupolas, steam micronizers, carbon black production.

Exclusive advanced design

Dracco Glass-Bag Filters are engineered systems of modular design which operate automatically and incorporate exclusive means of cleaning filter bags. The patented SONOCLEAN unit utilizes sonics to remove all dust without cloth wear or fracture. Alternately, for light flocculent dust, the patented SWING-CLEAN mechanism uses gentle motion to dislodge difficult dusts. Both SONOCLEAN and SWING-CLEAN assure long bag life which in some cases has exceeded two years.

For further information on Glass-Bag Filters, today's most advanced equipment for air pollution or hot dust problems, contact: Dracco Division of Fuller Co., Harvard Ave. and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY GENERAL OFFICES

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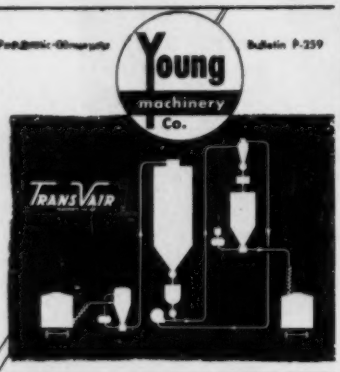

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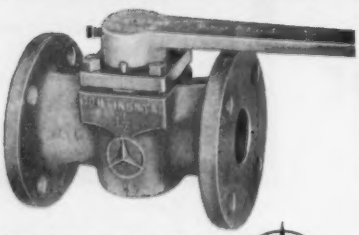

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- 150# and 300# service
- 1" through 6" sizes
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De Laval Separator Co. 94
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Drayer Hanson Div., National-U.S. Radiator Corp. 850
Durion Co., Inc. ..... 520 & 532
Falls Industries, Inc. 131
Fansteel Metallurgical Corp. 617
Frick Co. 1258-1260
Fuller Co. 446
General American Transportation Corp 435-436-442-446-495
Hardinge Co., Inc. 582
Heat Transfer Div., National-U.S. Radiator Corp. 850
Industrial Products Engineering Co. 1259
Jeffrey Mfg. Co. 97
Kennedy-Van Saun Mfg. & Engrg. Corp. 1036
Knight Co., Maurice A. 586
Mazzoni, O., S. P. A. 1412
National Carbon Co. 460-470
National-U.S. Radiator Corp. 850
Niagara Blower Co. 655
Peabody Engineering Corp. 1321
Pfaudler Permutit, Inc. ....110 & 141
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Pulva Corp. 220
Pulverizing Machinery Div., Metals Disintegrating Co., Inc. 632
Rietz Mfg. Co. 1231
Renneburg & Sons Co., Edw. 1078
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Smith Co., T. L. 986
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One of 50 GATX 20,000 gallon aluminum tank cars for glacial acetic acid service, delivered to Celanese Chemical Company by General American.

NEW GATX TANK CARS HAUL TWICE AS MUCH ACETIC FOR CELANESE!

Celanese Chemical Company produces millions of gallons of acetic acid—needs aluminum tank cars to transport it. Such cars, in standard 10,000 gallon size, have been supplied for many years by General American. Today a newly designed GATX car makes it possible to haul double the old quantity in one car.

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General American builds, leases and sells a wide variety of special purpose cars. Tell us about your requirements. If there is no car exactly suited to your needs, General American can design and build one.

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Pfaudler Permutit, Inc. ..... 110 & 141
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Technicon Controls, Inc. 316
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General American Transportation Corp. 435-436-442-446-495
Haveg Industries, Inc. 546
Knapp Mills, Inc. 175
Koven Fabricators, Inc. 74
North-Erie & American Process Equipment Div., National-U.S. Radiator Corp. 850
Posey Iron Works, Inc. 1407
Pressed Steel Tank Co. 631
Renneburg & Sons Co., Edw. 1078
Ross & Son Co., Inc., Charles 983-985
Sprout, Waldron & Co., Inc. 846-848
Yeomans Brothers Co. 1156

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Cleveland Mixer Co. 1067-1069
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Denver Equipment Co. 1146
Gabb Special Products, Inc. 1106
General American Transportation Corp. 435-436-442-446-495
Gifford-Wood Co. 219
Hockmeyer & Co., Herman 1178
Morehouse-Cowles, Inc. 814
Nettco Corp. 79
North-Erie & American Process Equipment Div., National-U.S. Radiator Corp. 850
Patterson Foundry and Machine Co. 154
Premier Mill Corp 1391
Ross & Son Co., Inc., Charles 983-985
Scientific Glass Apparatus Co., Inc. 332
Specialty Machinery Corp. 1413 & 1430
Star Tank & Filter Corp. 233
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331
U.S. Mixers, Div. of Stockdale Engineering Co. 1237
Yeomans Brothers Co. 1156

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Artisan Metal Products 874
Barnstead Still and Sterilizer Co. 416
Blaw-Knox Co. 581
Chemical and Pharmaceutical Industry Co., Inc. 1064
Consolidated Vacuum Corp. 1353
Dean Brothers Pumps, Inc. 1245-1247-1249
Distillation Engineering Co. 1048
Hospital Supply Co. Inc. 975
Hunt Machine Co., Rodney. 1240-1242-1244
Kimble Glass Co. 390
Lead Lined Iron Pipe Co. 70
New York Laboratory Supply Co., Inc. 1022
Packed Column Corp. 1171
Pfaudler Permutit, Inc. ..... 110 & 141
Podbielniak, Inc. 595
Porter Inc., George K. 1134-1136
Scientific Development Co. 382
Scientific Glass Apparatus Co., Inc. 332
Seavy & Sons, N. J. 1071
Star Tank & Filter Corp. 233
Stokes Corp., F. J. ..... 38 & 67
Tenso-Lab, Inc. 1123
U.S. Stoneware Co. 111
Wilmot Castle Co. 1033

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Chain Belt Co. 1416
Cleveland Worm & Gear Co. 158
Frick Co. 1258-1260
Glascote Products, Inc. 596
Jeffrey Mfg. Co. 97
Lehmann Co. Inc., J. N. 1429-31-46
Link-Belt Co. 165
Nettco Corp. 79
Pfaudler Permutit, Inc. ..... 110 & 141
Philadelphia Gear Corp. 123
Renneburg & Sons Co., Edw. 1078
Rockwell Manufacturing Co. 69
Star Tank & Filter Corp. 233
U.S. Electrical Motors, Inc. 837
U.S. Mixers, Div. of Stockdale Engineering Co. 1237
Westinghouse Electric Corp. 510
Worthington Corp. 545

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Devine Mfg. Co., J. P. 1372
Dorr-Oliver Inc. 531
Eimco Corp. 80
Filtration Engineers Div., American Machine & Metals, Inc. 456
Komline-Sanderson Engineering Corp. 1307-1309
North-Erie & American Process Equipment Div., National-U.S. Radiator Corp. 850
Renneburg & Sons Co., Edw 1078
Stokes Corp., F. J. ..... 38 & 67

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American Tool & Machine Co. 862
Baker Perkins, Inc. ..... 560 & 609
Bird Machine Co. 685
Blaw-Knox Co. 581
Hetherington & Berner, Inc. 1100
Pfaudler Permutit, Inc. ..... 110 & 141
Scientific Glass Apparatus Co., Inc. 332
Sharples Corp. 485
Tolhurst Centrifugals Div., American Machine and Metals, Inc. 506

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Abbé, Inc., Paul O. 984
Allis-Chalmers Mfg. Co. 636
Alsop Engineering Corp. 381
Baker Perkins Inc. ..... 560 & 609
Bartlett & Snow Co., C. O. 569
Blaw-Knox Co. 581
Blickman, Inc., S. 325
Bowen Engineering, Inc. 706
Bragar Co., Inc., Norman 1230-1232
Bryant Mfg. Co. 1089
Carrier Conveyor Corp. 127
Carver, Inc., Fred S. 90
Cleveland Mixer Co. 1067-1069
Colton Co., Arthur 50
Combustion Engineering, Inc., Raymond Div. 646
Davenport Machine & Foundry Co. 818
Dean Products, Inc. 184
Denver Equipment Co. 1146
Devine Mfg. Co., J. P. 1372
Fluid Energy Processing & Equipment Co. 813
Fuller Co. 446
General American Transportation Corp. 435-436-442-446-495
Glascote Products, Inc. 596
Hardinge Co., Inc. 582
Jeffrey Mfg. Co. 97
Kennedy-Van Saun Mfg. & Engrg. Corp. 1036
Koaline-Sanderson Engineering Corp. 1307-1309
Link-Belt Co. 165
Mazzoni, G., S. P. A. 1412
National Drying Machinery Co. 1112-1114
Nichols Engineering & Research Corp. 624
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. 850
Patterson Foundry and Machine Co. 154
Patterson-Kelley Co., Inc. ..... 188 & 215
Pfaudler Permutit, Inc. ..... 110 & 141
"Platecoil" Div., Tranter Mfg. Inc. 1206-1208-1210

How American Brake Shoe Maximates Production

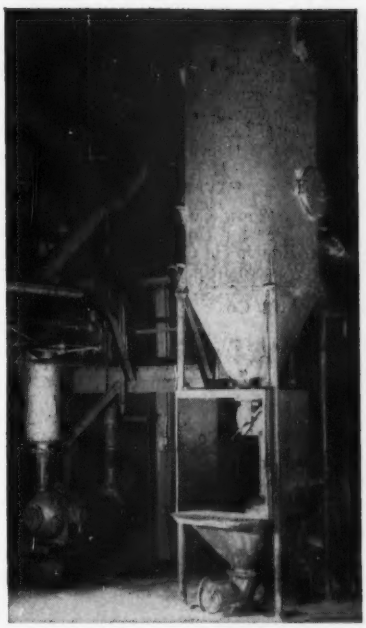
When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximate production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow*. With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique nonclogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350' distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2" through 6" pipelines, they are equipped with standard 8" flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.



A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

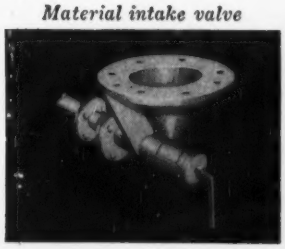
- flexibility
- cleanliness
- time saving
- lower initial cost
- easy installation
- material saving
- labor saving
- pay for themselves

FREE ENGINEERING SERVICE

If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximating production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

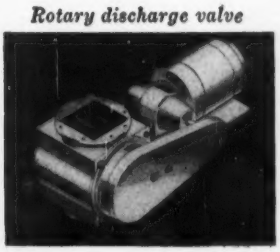
Air Appliance Division
Dept. EM
U. S. Hoffman Machinery Corp.
103 Fourth Avenue
New York 3, New York

Material intake valve

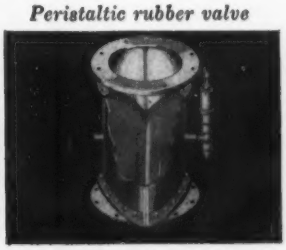


Hinge valve

Rotary discharge valve



Peristaltic rubber valve



Posey Iron Works, Inc. 1407
Proctor & Schwartz, Inc. 684
Renneburg & Sons Co., Edw. 1078
Sargent's Sons Corp., C. G. .1375-1377
Sales Corp. of America 979-981
Sharples Corp. 485
Standard Steel Corp. 153
Stokes Corp., P. J. .....38 & 67
Trinity Equipment Corp. 1392
Wilmot Castle Co. 1033

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Barnebey-Cheney Co. 52
Bartlett & Snow Co., C. O. 569
Centrifix Corp. 1180
Colonial Plastics Mfg. Co. 1283
Croll-Reynolds Co., Inc. 1054
Day Co. 45
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Ducon Co., Inc. 990-992
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Dustex Corp. 1299-1301
Fluid Energy Processing & Equipment Co. 813
Fuller Co. 446
General American Transportation Corp. 435-436-442-446-495
Hail Process Equipment Corp. ...1305
Haveg Industries, Inc. 546
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Industrial Products Engineering Co. 1259
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Minneapolis-Honeywell Regulator Co. 635
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Perkin Engineering Corp. 996
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Scientific Glass Apparatus Co., Inc. 332
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Superior Electric Co. 804
Syntron Co. 163
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Thompson-Ramo-Wooldridge Corp. 13
Welch Mfg. Co., W. M. 205
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Great Western Mfg. Co. 216
Howes Co. Inc., S. 1029
Jeffrey Mfg. Co. 97
Kennedy Van Saun Mfg. & Engrg. Corp. 1036
Link-Belt Co. 165
Pressed Steel Tank Co. 631
Renneburg & Sons Co., Edw. 1078
Sprout, Waldron & Co., Inc. ..846-848
Sturtevant Mill Co. 421
Syntron Co. 163
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Young Machinery Co., Inc., The .1087

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Allied Chemical Corp. ...955-957-959-961
Armour Industrial Chemical Co. .932-934
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Continental Oil Co. 930
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Gabb Special Products, Inc. 1106
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Industrial Products Engineering Co. 1259
Lehmann Co., Inc., J. M. ..1429-31-46
Manton-Gaulin Mfg. Co., Inc. 51
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Sonic Engineering Corp. 1122
Tri-Homo Corp. 214
Victor Chemical Works .936-938-940-963

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Allied Chemical Corp. 955-957-959-961

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Dorr-Oliver Inc. 531
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Kennedy Van Saun Mfg. & Engrg. Corp. 1036
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Lehmann & Co. Inc., J. M. .1429-1431-1446
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Star Tank & Filter Corp. 233
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Blaw-Knox Co. 581
Carbone Corp. 803
Centrifix Corp. 1180
Chicago Bridge & Iron Co. 844
Dean Products, Inc. 184
Devine Mfg. Co., J. P. 1372
Downingtown Iron Works, Inc., Div. of Pressed Steel Tank Co. 631
Fansteel Metallurgical Corp. 617
Fischer & Porter Co. 496
Frick Co. 1258-1260
General American Transportation Corp. 435-436-442-446-495
Hunt Machine Co., Rodney 1240-1242-1244
Knapp Mills Inc. 175
Laboratory Glass & Instruments Corp. 369
Mazzoni, G., S. P. A. 1412
National Carbon Co. 460-470
Niagara Blower Co. 655
Pfaudler Permutit, Inc. .... 110 & 141
"Platecoil" Div., Tranter Mfg., Inc. 1206-1208-1210
Pressed Steel Tank Co. 631
Renneburg & Sons Co., Edw. 1078
Schutte and Koerting Co. 61
Scientific Glass Apparatus Co., Inc. 332
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Worthington Corp. 545
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Yuba Consolidated Industries, Inc. 882-884-886

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Haveg Industries, Inc. 546
Heil Process Equipment Corp. ...1305
Ingersoll-Rand Co. 128
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Renneburg & Sons Co., Edw. ...1078
Schutte and Koerting Co. 61
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Allied Chemical Corp. 955-957-959-961
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Artisan Metal Products 874
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Dorr-Oliver Inc. 531
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American Tool & Machine Co. ...862
Artisan Metal Products 874
Blaw-Knox Co. 581
Bowen Engineering, Inc. 706

LINDE packaged oxygen plant sets nine-year record for availability!

THE LINDE oxygen plant shown here has been serving a leading chemicals producer "over-the-fence" continuously since 1949. Its operating log shows a 98%+ availability factor. This year, capacity has gone up from 360 to 800 tons of oxygen a day.

You can expect the same continuity of supply with a LINDE packaged plant serving your process. Your LINDE plant will be the product of fifty years' experience in the design, manufacture, and operation of air separation plants and low temperature equipment. LINDE is uniquely qualified to provide air separation plants for the supply of oxygen and/or nitrogen as well as the associated low temperature equipment for:

liquefying hydrogen, helium and fluorine
purifying hydrogen and helium
separating hydrogen from coke oven gas
ammonia and methanol synthesis
upgrading of natural gas
other extremely low temperature processes.

Put LINDE's more than 50 years' experience in gas separation techniques to work for you. Write Dept. CW-113, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

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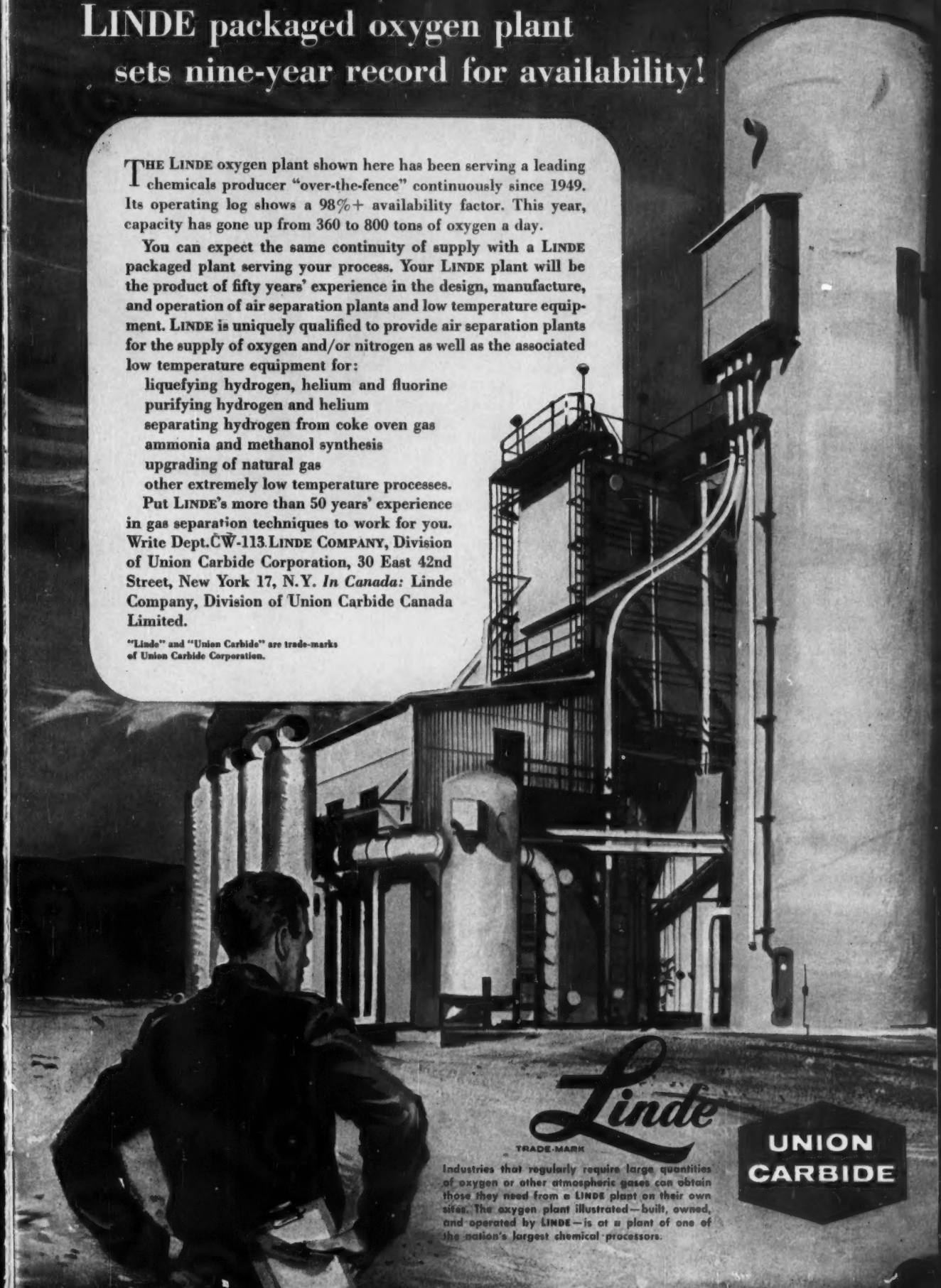

Linde
TRADE-MARK

UNION CARBIDE

Industries that regularly require large quantities of oxygen or other atmospheric gases can obtain those they need from a LINDE plant on their own sites. The oxygen plant illustrated—built, owned, and operated by LINDE—is at a plant of one of the nation's largest chemical processors.

Centrico, Inc. 842
Cleveland Miner Co. 1067-1069
Devine Mfg. Co., J. P. 1372
Dorr-Oliver Inc. 531
Glascote Products, Inc. 596
Koven Fabricators, Inc. 74
Mixing Equipment Co., Inc. 146
Peerless Mfg. Co. 1008
Podbielniak, Inc. 595
Scientific Glass Apparatus Co., Inc. 332
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Tenso-Lab., Inc. 1123
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331
Tolhurst Centrifugals Div., American Machine and Metals, Inc. 506
York Co. Inc., Otto H. 85

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De Bothezat Fans, Div. of American Machine and Metals, Inc. 556
Dracco Division of Fuller Co. 495
Duriron Co., Inc. ..... 520 & 532
Du Verre, Inc. 891
Fuller Co. 446
General Alloys Co. 193
General American Transportation Corp. 435-436-442-446-495
Haveg Industries, Inc. 546
Heil Process Equipment Corp. 1305
Industrial Plastic Fabricators, Inc. 1102
International Process Equipment Co., Inc. 812
Kennedy Van Saun Mfg. & Engrg. Corp. 1036
Renneburg & Sons Co., Edw. 1078
Sprout, Waldron & Co., Inc. 846-848
Young Machinery Co., Inc., The 1087

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B-I-F Industries, Inc. 660
Bartlett & Snow Co., C. O. 569
Bucket Elevator Co. 1038
Carrier Conveyor Corp. 127
Cleveland Vibrator Co. 993-995
Dracco Div. of Fuller Co. 495
Erie Mfg. Co. 909-911
Exact Weight Scale Co. 21
Fuller Co. 446
Galigher Co. 843
General American Transportation Corp. 435-436-442-446-495
Gump Co., B. F. 1024-1026
Hapman Conveyors, Inc. 1358
Hardinge Co., Inc. 582
Jeffrey Mfg. Co. 97
Kennedy Van Saun Mfg. & Engrg. Corp. 1036
Link-Belt Co. 165
Norcross Companies, Sterling E. 991
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Proctor & Schwartz, Inc. 684
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Vibro Plus Products, Inc. 1393
Wallace & Tiernan, Inc. 686
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Minerals & Chemicals Corp. of America 950
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Ertel Engineering Corp. 623
Glengarry Processes, Inc. 60
Gump Co., B. F. 1024-1026
Mettler Instrument Corp. 339
Pfaudler Permutit, Inc. ..... 110 & 141
Richardson Scale Co. 1151-1153
Scientific Glass Apparatus Co., Inc. 332

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American Plant Equipment Co. 1282-1284
Barnebey-Cheney Co. 52
Brown Co. 923
Eagle-Picher Co. 1167-1169
Great Lakes Carbon Corp., Dicalite Dept., Electrode Div. 204
Hercules Filter Corp. 213
Johns-Manville Sales Corp. 172-176
Republic Seitz Filter Corp. 977
Scientific Glass Apparatus Co., Inc. 332
West Virginia Pulp & Paper Co., Industrial Chemical Sales Div. 924-926

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American Plant Equipment Co. 1282-1284
Brown & Co., J. G. 1093
Eimco Corp. 80
Filtration Fabrics, Div. of American Machine and Metals, Inc. 556
Komline-Sanderson Engineering Corp. 1307-1309
Multi-Metal Wire Cloth Co., Inc. 191
National Filter Media Corp. 1113
Scientific Glass Apparatus Co. 332
Shriver & Co., Inc., T. 473
Sperry & Co., D. R. 1362

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American Plant Equipment Co. 1282-1284
Buffalo Wire Works Co., Inc. 1381
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Hercules Filter Corp. 213
Micro Metallic Div., Pall Corp. 1012-1014
Multi-Metal Wire Cloth Co., Inc. 191
Newark Wire Cloth Co. 183
Southwestern Engineering Co. 1250-1252
Tyler Co., W. S. 574

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Alsop Engineering Corp. 381
Eaton-Dikeman Co. 1120
Ertel Engineering Corp. 623
Filtration Fabrics Div., American Machine and Metals, Inc. 556
General Laboratory Supply Co. 310
Hercules Filter Corp. 213
Jacoby-Tarbox Corp. 1362
National Filter Media Corp. 1113
Republic Seitz Filter Corp. 977
Scientific Glass Apparatus Co., Inc. 332
Shriver & Co., Inc., T. 473
Sparkler Mfg. Co. 56
Star Tank & Filter Corp. 233
Tenso-Lab., Inc. 1123
Terriss Div., Consolidated Siphon Supply Co., Inc. 1329-1331
Welch Mfg. Co., W. M. 205

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Adams Co., Inc., R. P. 836
American Air Filter Co., Inc. 676
American Plant Equipment Co. 1282-1284
American Tool & Machine Co. 862
B-I-F Industries, Inc. 660
Barnebey-Cheney Co. 52
Barnstead Still and Sterilizer Co. 416
Beckley, Haltom & Hickman 1342-1363
Bird Machine Co. 685
Bishop & Co., Platinum Works, J. 900-902
Blickman, Inc., S. 325
Brown & Co., J. G. 1093
Carver, Inc., Fred S. 90
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Commercial Filters Corp. 223
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Croll-Reynolds Engineering Co., Inc. 1054
Day Co. 45
Denver Equipment Co. 1146
Dorr-Oliver Inc. 531
Dracco Div. of Fuller Co. 495
Duriron Co., Inc. ..... 520 & 532
Eimco Corp. 80
Ertel Engineering Corp. 623
Filtration Engineers Div., American Machine and Metals, Inc. 456
Filterite Corp. 1303
Filtros Inc. 854-856
Flanders Filters, Inc. 937
Fuller Co. 446
Galigher Co. 843
Hardinge Co., Inc. 582
Hercules Filter Corp. 213
Hungerford & Terry, Inc. 1164-1166
Industrial Filter & Pumping Mfg. Co. 1188-1202
Jacoby-Tarbox Corp. 1362
Knight Co., Maurice A. 586
Komline-Sanderson Engineering Corp. 1307-1309
Micro Metallic Div., Pall Corp. 1012-14
Multi-Metal Wire Cloth Co., Inc. 191
Nalge Co., Inc. 1201
Newark Wire Cloth Co. 183
Niagara Filters Div., American Machine and Metals, Inc. 506
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. 850
Norton Co. 1289-1291
No Vo Div., Industrial Enterprises, Inc. 1030
Peerless Mfg. Co. 1008
Process Filters Div., Bowser, Inc. 1115
Purolator Products, Inc. 15
Read Standard Div., Capitol Products Corp. 162
Republic Seitz Filter Corp. 977
Scientific Class Apparatus Co., Inc. 332
Selas Corp. of America 979-981
Sharples Corp. 485
Shriver & Co., Inc., T. 473
Sly Mfg. Co., W. W. 73
Sparkler Mfg. Co. 56
Sperry & Co., D. R. 1362
Star Tank & Filter Corp. 233
Terries Div., Consolidated Siphon Co., Inc. 1329-1331

Graver's Experience Counts So Much When Cryogenic Storage Calls for Jacketed Stainless Steel Spheres

A practical and efficient method of storing liquid oxygen at customers' plants was found in 9 ft. double-shell spheres by the Linde Company (Div. of Union Carbide). Type 304 stainless steel was specified for the inner shell, carbon steel for the outer shell.

Keeping oxygen liquid at 297° below zero for prolonged periods required air-tight welding to assure holding a vacuum between the shells where a Linde-patented powder-vacuum insulation is employed.

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Ni-Resist* pumps have been in caustic service at the Portland, Oregon plant of the Pennsalt of Washington Division, Pennsalt Chemicals Corporation, for eleven years . . .

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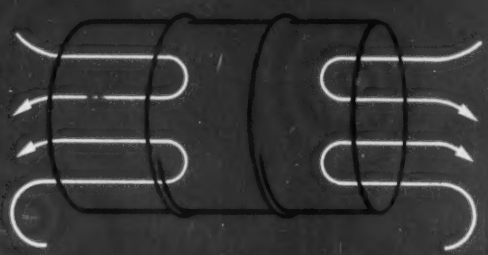
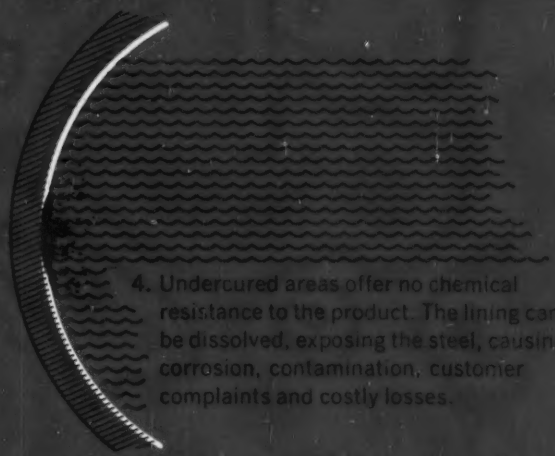
1. The lined drums you buy

2. may be improperly cured. This condition cannot be detected by eye or by touch before filling.



3. In ordinary or horizontal baking systems, the hot air of the ovens may not reach all parts of the lining uniformly.



4. Undercured areas offer no chemical resistance to the product. The lining can be dissolved, exposing the steel, causing corrosion, contamination, customer complaints and costly losses.

5. Rheem Vertical Curing sends drums through ovens upright. They act as natural chimneys, drawing the controlled temperature air uniformly over every square inch of lining. The result:

NO UNDERCURED AREAS

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INSULATING MATERIAL—HEATING, ELECTRIC AND MOLDED

Allied Chemical Corp. 955-957-959-961
Allis Co., Louis 100
Aluminum Co. of America 559
Eagle-Picher Co. 1167-1169
Ethylene Corp. 971
General Plastics Corp. 967
Great Lakes Carbon Corp., Dicalite Dept., Electrode Div. 204
Harbison-Walker Refractories Co. 1241-1243
Johns-Manville Sales Corp. ...172-176
Keasbey & Mattison Co. 822
Pennsylvania Fluorocarbon Co., Inc. 969
Pittsburgh Corning Corp. 1239
Scientific Glass Apparatus Co., Inc. 332
Thermon Mfg. Co. 1207
Titanium Alloy Mfg. Div., National Lead Co. 234
Westinghouse Electric Corp. 510

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Harbison-Walker Refractories Co. 1241-1243
Johns-Manville Sales Corp. ...172-176
Norton Co. 1289-1291
Owens-Corning Fiberglas Corp. ..1266
Pittsburgh Corning Corp. 1239

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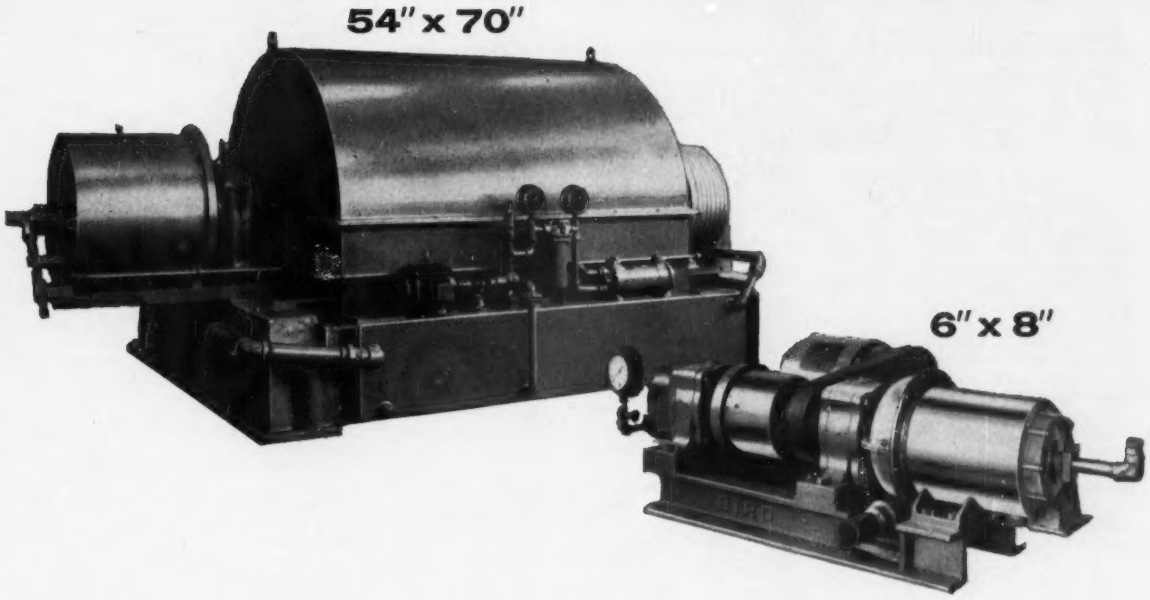
Barco Mfg. Co. 439
Carey Mfg. Co., Philip 1152
Chiksan Co., Subsidiary of Food Machinery & Chemical Corp. 1268-1270
Continental-Emsco Co. 868

What's the Right Size BIRD *for* YOUR *solid-liquid separating job?*



The Bird Continuous Centrifugal with 6-inch dia. bowl is ideal not only for experimental work but for production when volumes are relatively small.

The Bird with 54-inch dia. bowl delivers well dried solids at rates up to a ton or more per minute.

In between are sizes to match almost any volume or process requirement.

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With the Bird you don't fit your job to the machine. You fit the Bird to the job. The Bird Research and Development Center is equipped to help you select, by pilot-scale test, the one best size and design (there are 25 variations) to do the best job for you at the lowest cost.

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Haveg Industries, Inc. 546
Nukem Products Corp. 1072
RKL Controls, Inc. 1405
Raybestos-Manhattan, Inc. 820
Resistoflex Corp. 893-895-897
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Yuba Consolidated Industries, Inc. 882-884-886

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Mazzoni, G., S. P. A. 1412
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Trent, Inc. 195
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U. S. Stoneware Co. 111

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Allis-Chalmers Mfg. Co. 636
American Gas Furnace Co. 833
Bartlett & Snow, C. O. Co. 569
Carrier Conveyor Corp. 127
Chicago Bridge & Iron Co. 844
Davenport Machine & Foundry Co. 818
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General American Transportation Corp. 435-436-442-446-495
Kennedy Van Saun Mfg. & Engrg. Corp. 1036
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Enjay Co., Inc. 944-946-948

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Westinghouse Electric Corp. 510

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Heil Process Equipment Corp. ..1305
Knapp Mills, Inc. 175
Lead Industries Assn. 816
Lead Lined Iron Pipe Co. 70
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Rietz Mfg. Co. 1231
Ross & Son Co. Inc., Charles 983-985
Supreme Div., Franklin P. Miller & Son, Inc. 1010

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Allis-Chalmers Mfg. Co. 636

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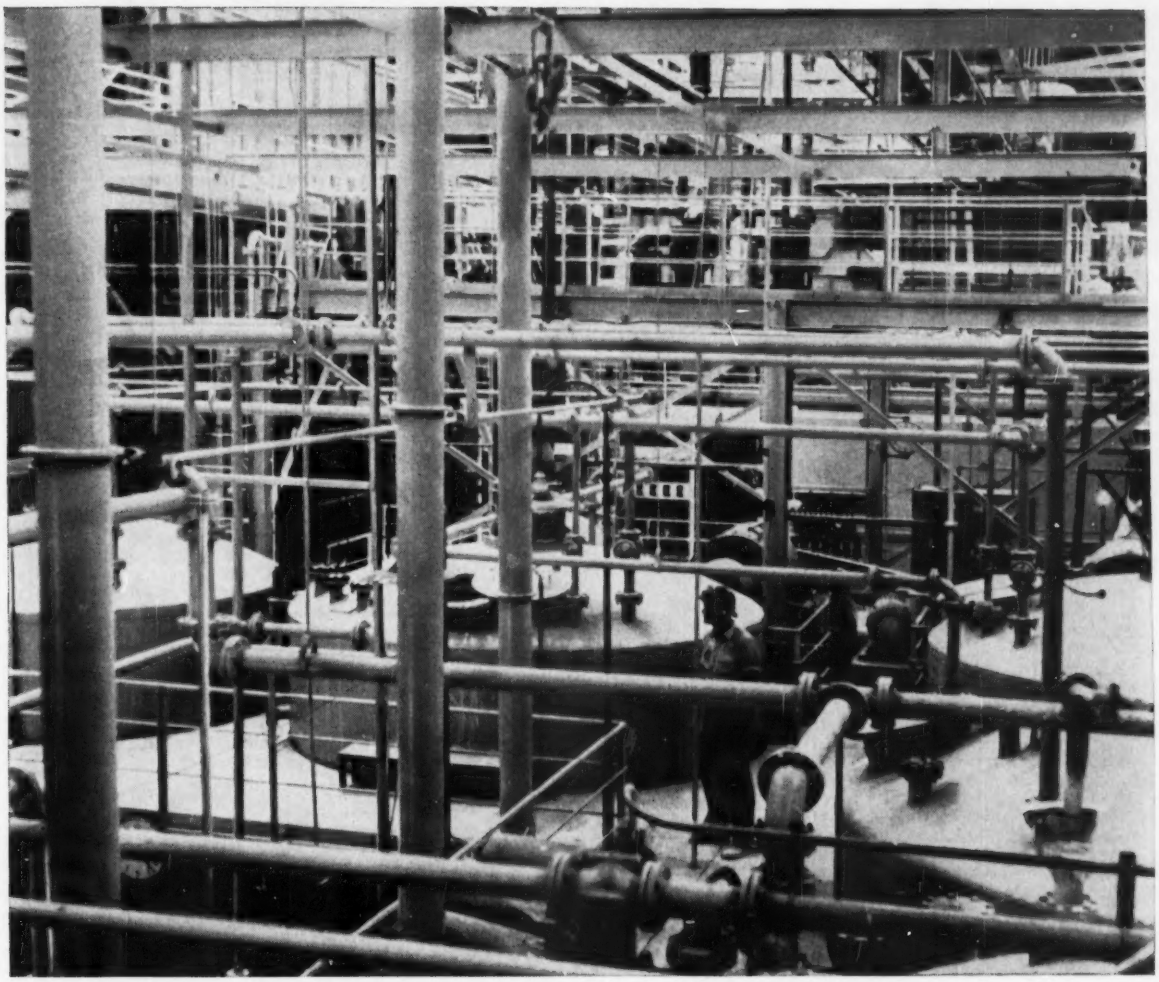

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When a complex piping system carries corrosive process liquors . . . when it must withstand constant thermal stress imposed by its high-temperature cargo . . . corrosion resistance and high physical strength are the keys to pipeline dependability.

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The chemical activity and high temperatures of the pipe's contents are severe threats to pipeline durability, but thanks to the extreme corrosion resistance and high strength of Saran Lined Pipe it has performed dependably for American Cyanamid since installation four years ago.

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Fuller Co. 446
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Southwestern Engineering Co. .1250-1252
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Daffin Mfg. Co. 1400-1404
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Entoleter Div., Safety Industries, Inc. 1599
Gabb Special Products, Inc. 1106
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Gump Co., B. F. 1024-1026
Hetherington & Berner, Inc. 1100
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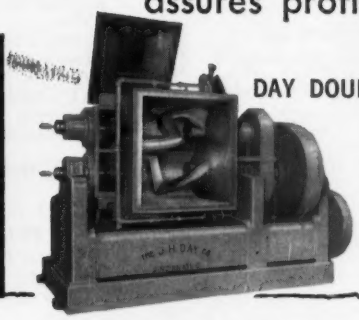

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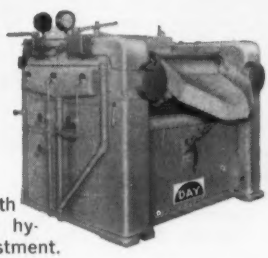

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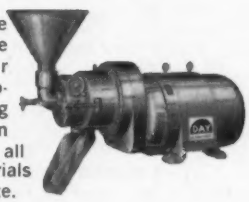

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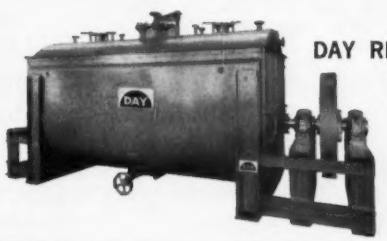

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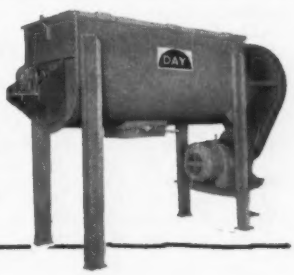

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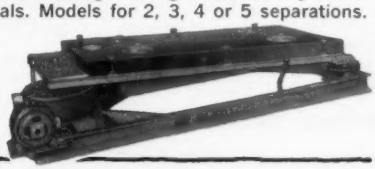

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Philadelphia Gear Corp. 123
Posey Iron Works, Inc. 1407
Premier Mill Corp. 1391
Rapids Machinery Co., Inc. 1162
Read Standard Div. Capitol Products Corp. 162
Renneburg & Sons Co., Edw. ...1078
Rietz Mfg. Co. 1231
Ross & Son Co., Inc., Charles 983-985
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Sonic Engineering Corp. 1122
Sprout, Waldron & Co., Inc. 846-848
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Sturtevant Mill Co. 421
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General Electric Co. 482
Glascote Products, Inc. 596
Reliance Electric & Engineering Co. 10
Superior Electric Co. 804
U.S. Electrical Motors. Inc. 837
Westinghouse Electric Corp. 510
Yuba Consolidated Industries, Inc. 882-884-886

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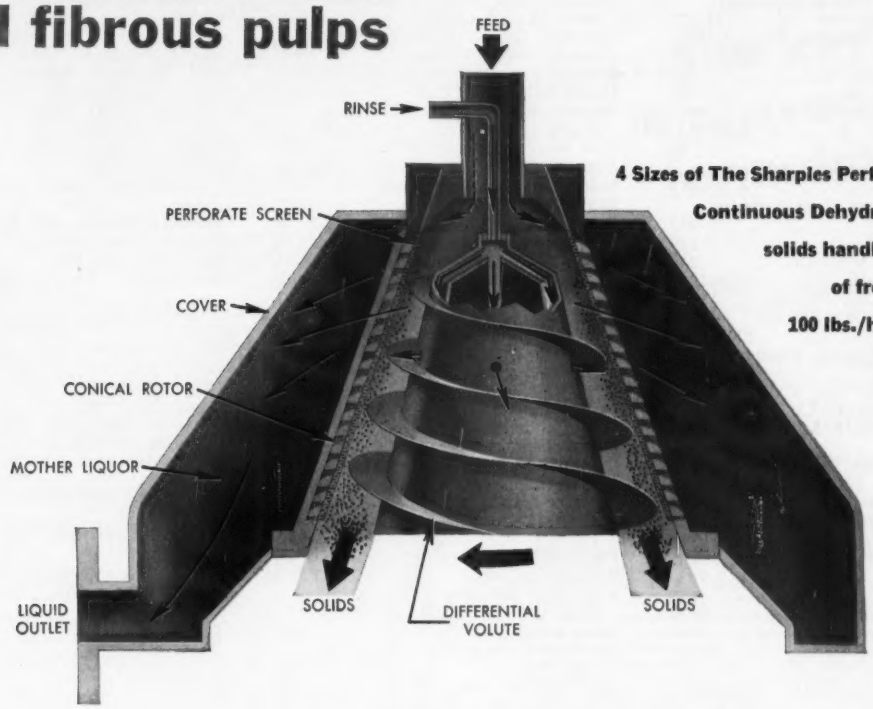
flexibility for deliquefying crystalline solids and fibrous pulps



4 Sizes of The Sharples Perforate Screen Continuous Dehydrator provide solids handling capacity of from less than 100 lbs./hr. to 70 tons or more/hr.

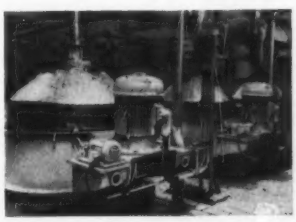
THERE ARE WIDELY DIFFERENT BENEFITS to be derived from the Sharples Continuous Dehydrator, depending on the product.

Dewatering high concentration sodium chloride and potash . . . processing starch or other fruit and vegetable products containing fibrous solids . . . deliquefication of organic crystals that must not be changed in size or shape . . . each of these typical yet widely different applications makes use of the fact that the Continuous Dehydrator combines the *separating action* of high centrifugal force, the *filtering action* of the replaceable screen, and the *metering action* of the differential volute.

This combination of forces applied to certain slurries is ideal. The ability to change screen size and vary rotational speed as desired, and the gentle, controlled action of the differential volute are additional advantages for processing flexibility.

THE SHARPLES CONTINUOUS DEHYDRATOR, available in four sizes, including the Model 510 with solids handling capacity of 70 tons per hour or more, supplements the well-known line of Sharples Centrifuges for deliquefying solids.

Write today for literature about the advanced design Sharples Continuous Dehydrator.



A Typical battery installation of Continuous Dehydrators

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EPOXIDES

...the key to improved resin formulations

PLASTICS
COATINGS
LAMINATES
CASTINGS
ADHESIVES

One of the major suppliers of epoxides, FMC Chemicals and Plastics Division offers a broad range of these chemicals for resin use, including:

Octylene Oxide — **Limonene Monoxide**
Dodecene Oxide — **Alpha-Pinene Oxide**
C16-C18 Olefin Oxide — **Limonene Dioxide**
Dicyclopentadiene Dioxide

Among the areas where these epoxides contribute significant advantages are:

REACTIVE DILUENTS AND MODIFIERS FOR EPOXY RESINS

Olefin oxides such as **Octylene oxide** are efficient viscosity reducing agents, entering into the curing reaction and becoming an integral part of the final resin. Auxiliary benefits are improved low temperature flexibility, prolonged pot life for polyamine curing systems, and moderated exotherm. **Limonene dioxide** can be similarly applied as a reactive diluent. As a bifunctional diepoxide it contributes viscosity reduction with minimum effect on end physical properties, such as heat distortion point. These diluents can be used in casting applications particularly at high solid loadings, and in preparation of laminates where efficient wetting necessitates a low viscosity material. They also have application as reactive solvents for 100% active coating systems and adhesives.

HIGH TEMPERATURE RESINS

Dicyclopentadiene dioxide gives extremely high heat distortion point resins on curing with anhydrides in the presence of glycols. Although **Dicyclopentadiene dioxide** is itself a high melting solid the curing formulations are liquid and have good pot life.

POLYOLS FOR POLYURETHANE RESINS

Octylene oxide and related olefin oxides can be homo-polymerized or copolymerized to give unique polyols for polyurethane manufacture. Use of small amounts of **Octylene oxide** for preparation of a propylene oxide polyol breaks up the crystalinity of the polymer and contributes to improved flexibility. The alkyl side chains contribute to improved solubility of polyurethane coatings. The high carbon-hydrogen to oxygen ratio is of interest for solid propellants based upon polyurethanes.

CROSSLINKING AGENTS

Diepoxides such as **Dicyclopentadiene dioxide** and **Limonene dioxide** find use as crosslinking agents for polymers containing active hydrogen functional groups, e.g. carboxy, amino. Thus, vinyl and acrylic polymers containing carboxy groups may be insolublized and crosslinked after being laid down with a dioxide curing system. Curable liquid resins with active functional groups may similarly be crosslinked as in casting applications.

FOR PREPARATION OF ALKYDS AND POLYESTERS

A mono-oxide may be considered as a diol and a diepoxide as a tetrol for the preparation of modified alkyds and polyesters.

STABILIZATION OF CHLORINATED RESINS

Epoxides are excellent stabilizers for chlorinated polymers as polyvinyl chloride, chlorinated rubbers, etc.

Write FMC for technical information on these and related epoxides.

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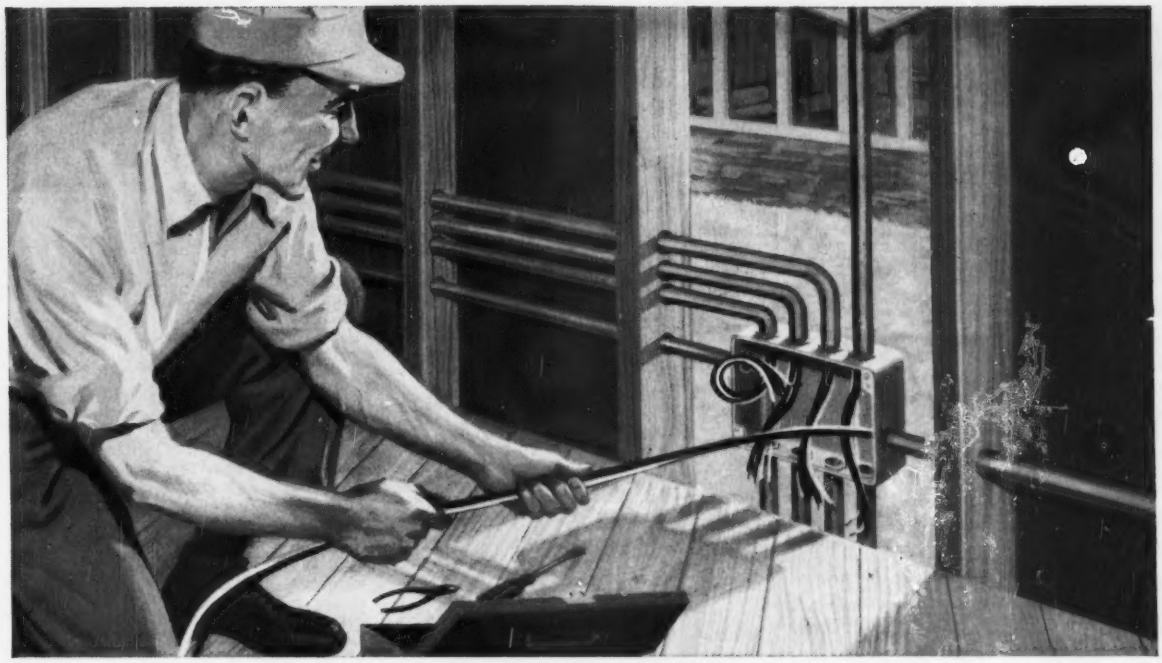

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A "housepower" boom is in the making.

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National Lead Company works closely with the electrical industry to solve specific vinyl insulation problems. Work of this kind helped it to become the country's biggest producer of vinyl insulation stabilizers.

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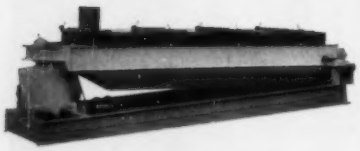

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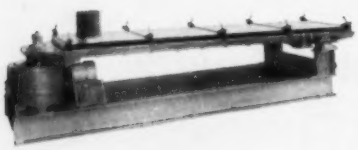

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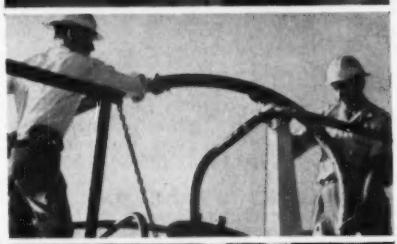

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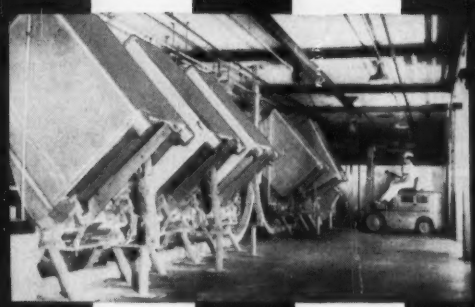

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$$R_2NH \xrightarrow[2.\ RCl]{1.\ NaNH_2} RR_2N$$
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Alkylation of active methylene groups:

$$\diagup CH_2 \diagdown \xrightarrow[2.\ RCl]{1.\ Na + alcohol} \diagup CHR \diagdown$$

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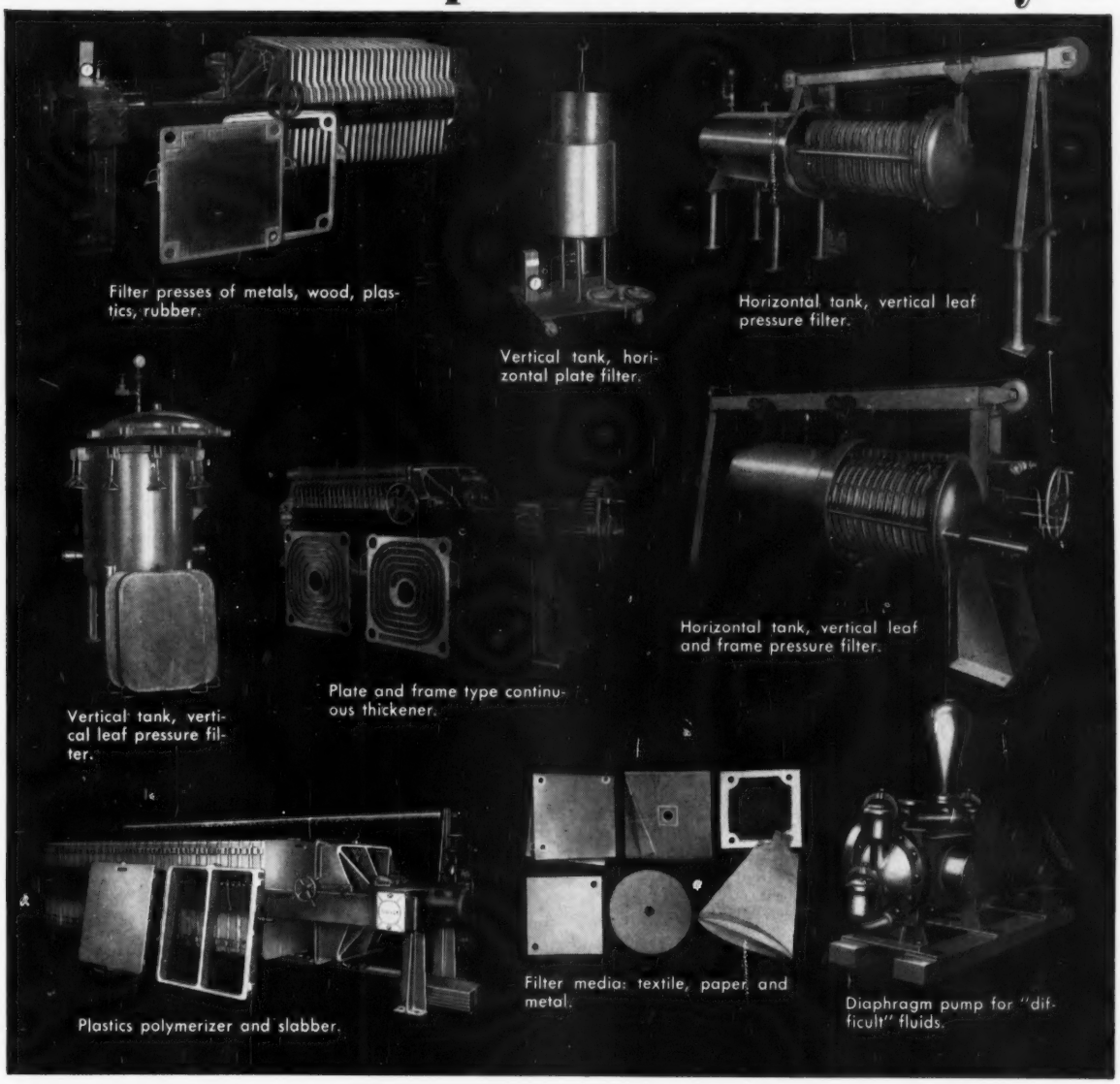
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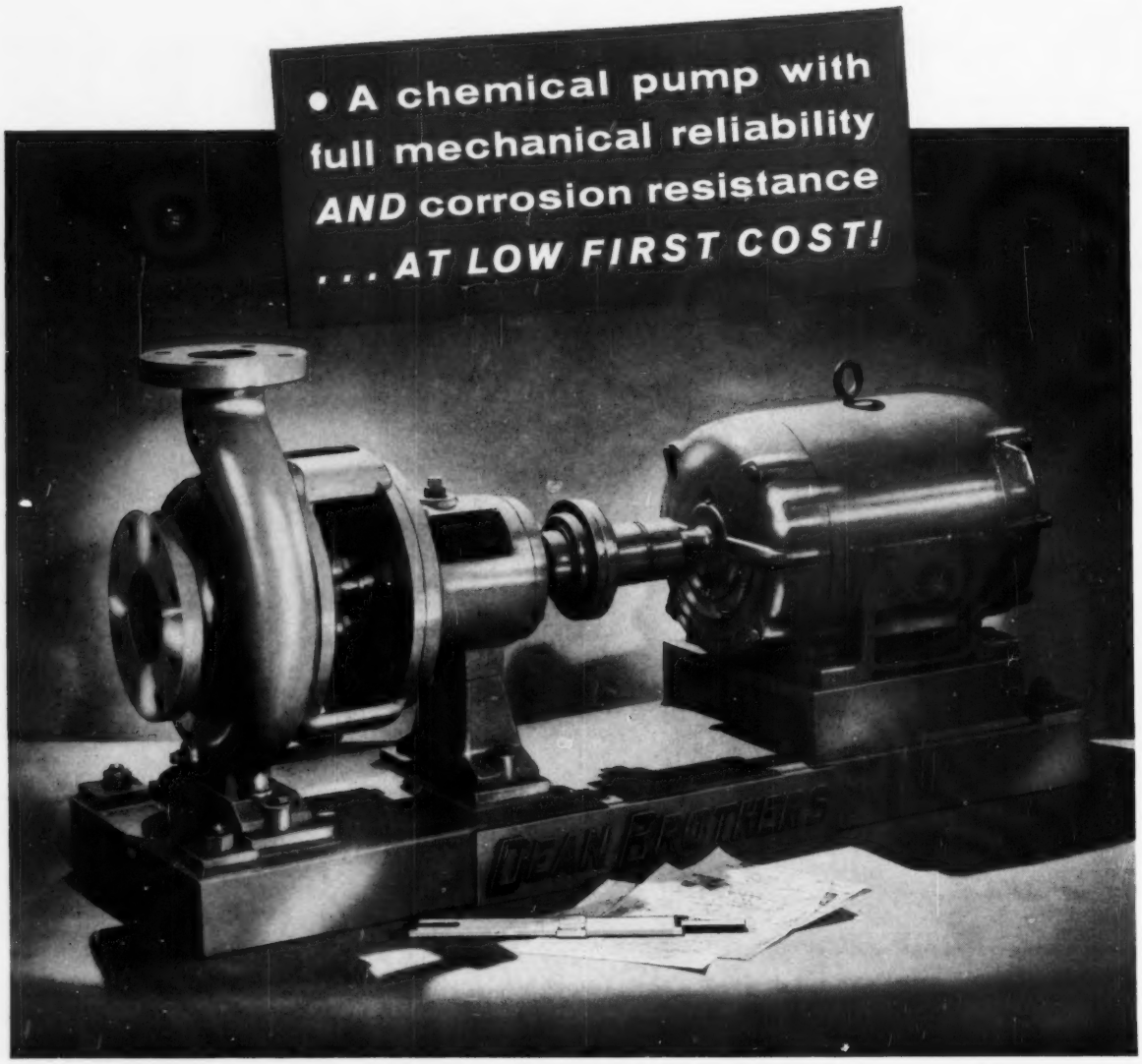

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New disperse dyes get a tryout in this jig at Eastman's Kingsport, Tenn., research laboratories.

Rolling Up Gains for New Polyester Dyes

This week dyers are getting acquainted with Latyl Brown MS, Genacron Blue 2 GLL, and Polyester Brilliant Orange 2RL—new offerings of Du Pont, General Aniline & Film, and Eastman Kodak, respectively. These newcomers — all so-called disperse dyes — reflect research that is helping push this colorant class to $15-million/year sales.

Most of the recently introduced disperse dyes (which form a solid solution with fiber in the dye bath rather than coloring only the fiber's surface, as other dyes do) are designed to dye polyester fibers (Dacron, Terylene, Kodel, Vitel) and bear little resemblance to early members of the disperse family. Unlike the latter, they frequently have little affinity for acetate and nylon and require high temperature and high pressure or a chemical carrier (e.g., *o*-phenylphenol) for application. But they feature superior lightfastness and resistance to sublimation and washing.

Behind the burgeoning fortunes of the disperse family, of course, is the steady growth of polyesters in textiles. The demand for good, economical polyester dyes is being met not only by Du Pont, GAF and Eastman (the three major producers) but also by Koppers, Interchemical Corp. and, to a lesser degree, by firms such as Sandoz, Ciba and Francolor. Du Pont and Eastman, each with a historical interest in cellulose acetate fiber, got an early start on disperse dye research. This research was stepped up with the advent of Du Pont's Dacron and Eastman's Kodel.

Eastman, which does its dye research at Kingsport, Tenn., says its activity in the field of disperse dyes goes back about 30 years, when cellulose acetate was struggling to find acceptance as a textile fiber.

"At that time," says Eastman, "there were few dyes available that would color cellulose acetate, and those were of very inferior colorfastness, quite expensive, and generally available only from European manufacturers. Since the commercial success of any textile fiber depends to a large degree on its ability to be colored, Eastman undertook to develop a line of relatively economical dyes that would exhibit superior fastness properties." This parallels Du Pont's experience.

When Dacron came along, the dyeing problem became more complicated. Key Du Pont researchers Paul Meunier (applications) and Samuel Boyd (synthesis) recall, "The first

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dyes for Dacron represented a sharp transition for the disperse class. The big requirement was sublimation resistance, because of the high temperatures (over 400 F) encountered in Dacron textile processing. Once this requirement was met, the research branched out to find a broader range of colors with a variety of good fastness properties, and to an over-all attempt to get dye costs down."

No startling innovations in chemical structure have come from this research, they reveal. The new dyes are modifications of previously known compounds. For a while, tricyano vinyl types looked promising, but these turned out to lack hydrolytic stability.

Another pioneer researcher in this field is GAF's David Randall, now the firm's technical coordinator of dyestuffs and pigments. "By and large, when you want lightfastness in a disperse dye," says Randall, "the anthraquinone types are pre-eminent. Disperse azo dyes feature good sublimation resistance. But we have a novel color, Genacron Yellow 4 LL, that is neither azo nor anthraquinone and is the most lightfast of all the disperse yellows (200 hours)" There are also a few naphthoquinone types of disperse dyes, but the newer dyes are generally heavier-molecular-weight versions of older types.

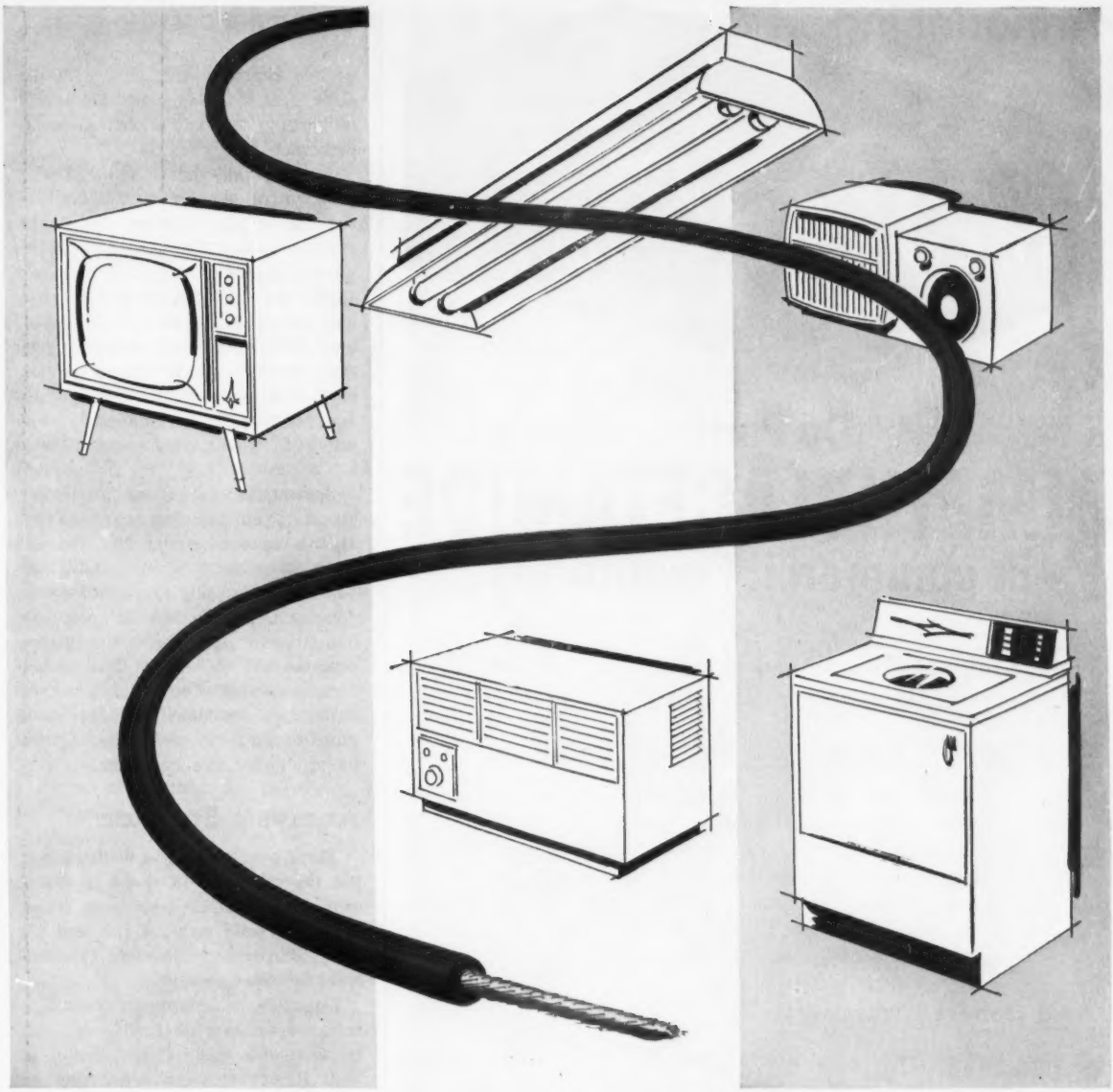
In general, all disperse dye researchers are looking for brighter, cheaper, level-dyeing dyes, that are faster to light and sublimation, won't stain companion fibers (e.g., cotton or wool in blends) and which have improved compatibility with other dyes. The last-named trait is the ability

Automation Speeds Drug Testing

To measure the potency of an antibiotic, this technician has only to pour the test sample into a spectrophotometer; electronics does the rest. This system, described as the first successful application of automation in microbiological testing, is in use at the biological control laboratories of Chas. Pfizer & Co. (New York).

Because turbidity is proportional to the amount of bacteria present, the spectrophotometer can measure potency of antibiotic samples by gauging their clarity. A digital voltmeter (*center*) converts voltage output of the spectrophotometer into a digital pulse that is recorded on a punchcard, which can then be processed by an IBM 650 computer.

Savings, using this system: data is computed in six minutes instead of the 30 hours required by hand calculation, is summarized on one sheet of paper instead of on five.



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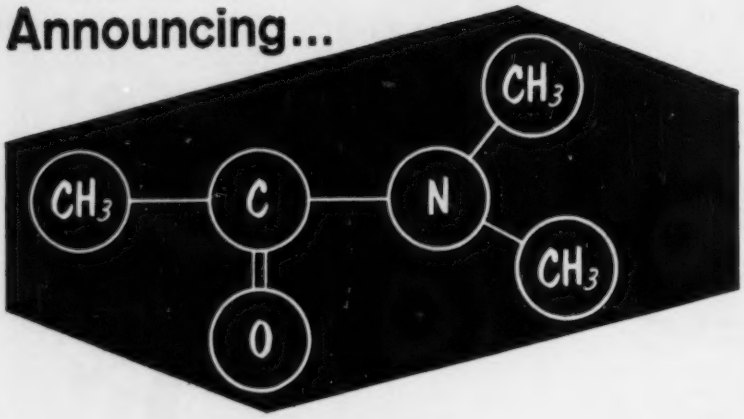

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of two or more dyes to dye at the same rate, "building up on tone," minimizing the dyer's need to hand-pick such colors.

In addition, there is the major problem of finding a "full-bodied" red that is also lightfast. Du Pont's effort to adapt the chemistry of its ultralightfast red Monastral pigments (*CW, Aug. 30, '58, p. 49*) to dyes has not been successful. Currently used reds are pinkish, with relatively low tinctorial power per dollar. A navy blue that's economical, lightfast and resistant to sublimation is also required, as is a good disperse black for polyesters.

Answers to these problems are coming along, although not nearly so fast as dye makers would like. Meanwhile, disperse dyes are looking for new uses and dyeing application methods—for example, Mylar polyester film is now being dyed commercially, with the use of disperse dyes in hot organic solvent. Lab men closest to these dyes are convinced they're a growth prospect—and sales figures haven't dulled this optimism.

Analysis Speedup

Three novel analytical methods that put the emphasis on speed in determining (1) pesticide residue on crops, (2) liquid/solid ratio of fats and (3) early diagnosis of various diseases were described recently.

Detection of phosphate ester insecticide residues on food crops can be accurately made at the rate of at least 10 extract samples per hour by means of an automatic, self-regulating analysis system. The system, described by George Winter of Technicon Instruments Corp. (Chauncey, N.Y.), measures the inhibition of acetylcholinesterase by the insecticide and is sensitive to one part per billion in many cases.

Fat determination can be made speedily by nuclear magnetic resonance (NMR) analysis, according to Herbert Rubin of Schlumberger Well Surveying Corp.'s Ridgefield Instrument Division (Ridgefield, Conn.). NMR gives determinations in 30 seconds, compared with the lengthy conventional method involving use of a dilatometer.

New early diagnosis of cancer, hepatitis and mumps is a goal of current urinalysis studies, reports Helen

Free of Ames Co.'s research laboratories (Elkhart, Ind.). The possibility of cancer detection by urinalysis lies in recent medical reports linking urine catecholamine level with pheochromocytoma.

Citrus Saver

At the University of California (Riverside) this week, researchers Joseph Eckert and Martin Kolbezen are working on a promising new method of preventing decay of oranges in shipment. The key: chemically impregnated paper that releases a decay spore-killing gas.

Two sheets of the paper—impregnated with sodium dichloroisocyanurate—are placed in each carton of fruit. Humidity produced by the fruit causes the chemical to gradually decompose and give off the fungicidal gas, nitrogen trichloride, thus affording extended protection. The gas provides a protective atmosphere that does not enter the fruit and has no objectionable odor. There is believed to be no problem of toxicity.

Before the method can be offered to industry for trial, however, a stronger paper carrier is needed and resistance to high temperatures must be developed.

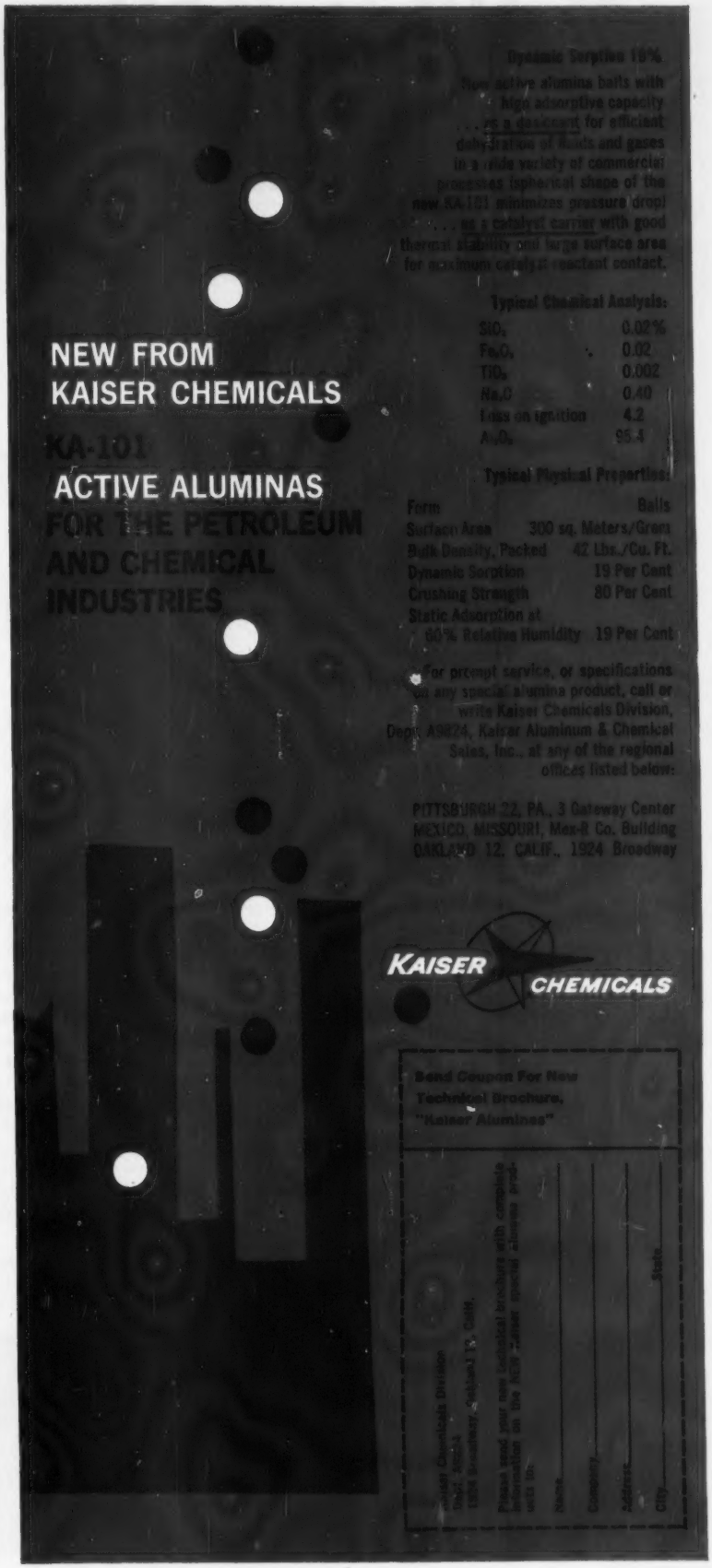
EXPANSION

• Illinois Institute of Technology has been given both site and buildings formerly used by the John A. Steen Varnish Division of DeSoto Chemical Coatings, Inc. (Chicago). Armour Research Foundation, an IIT affiliate, will use the facilities for pilot-plant studies.

• University of Wisconsin (Madison) has received regents' approval of preliminary plans for a $2.6-million chemistry building. Contracts for the new building, which will be devoted mostly to research, are expected to be let by June '60.

• Witco Chemical Co. is building a new laboratory and plant-office building at Los Angeles. At the site of two Witco plants, the new labs are intended primarily for control and customer service.

• U.S. Dept. of Agriculture recently dedicated its $105,000 wool processing laboratory at Albany, Ore. Described as a factory in miniature, the new 18,000-sq.ft. lab has facilities



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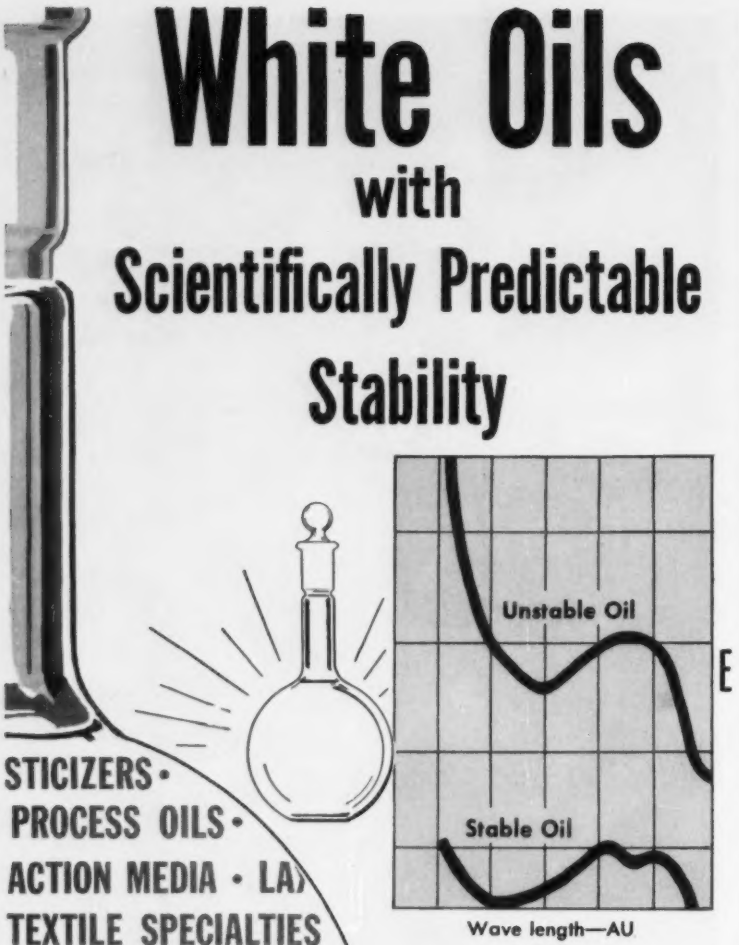

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RESEARCH

for duplicating all the steps in wool processing. It will house the main effort of USDA's Agricultural Research Service to develop wool fabrics with improved properties, including machine-washability, greater resistance to wear and soiling.

• Du Pont's Yerkes Research Laboratory at Buffalo, N. Y., has recently completed a $1.5-million renovation. It is the largest of the Film Dept.'s four research facilities.

• Oak Ridge Institute of Nuclear Studies — a nonprofit educational corporation formed by 37 Southern universities—recently dedicated its first nongovernment-owned facility, a $250,000 administration building at Oak Ridge, Tenn.

• Black-Clawson Co., Inc. (Hamilton, O.), has begun construction of a laboratory in Middletown, O., for research on paper stock preparation and papermaking operations. The new building will house the dry-testing laboratory now at the firm's Dilts Division in Fulton, N. Y., and provides for future expansion.

PRODUCTS

Pharmaceutical Import: Fallek Products Co. (New York) is now marketing orotic acid (2,6-dioxypyrimidine-4-carboxylic acid) in the U.S. The acid is manufactured by Takeda Pharmaceutical Industries, Ltd. (Osaka, Japan). Orotic acid, offered for research use only, is a precursor of nucleic acid in biosynthesis, acts to protect the liver, stimulate blood cell formation and promote growth.

•

Ion-Exchangers: Bio-Rad Laboratories (Richmond, Calif.) offers a new series of ion-exchange resins for the separation and analysis of amino acids. Resins are available for use in three types of fraction collectors and in three sizes of amino-acid analyzers.

•

Protein Analyzers: A kit of PTH (3-phenylthiohydantoin) derivatives of amino acids is now available from Mann Research Laboratories (New York) for use as standards in protein analysis. The N-terminal amino acid — and three to four subsequent amino acids — can be identified by sequential degradation, resulting in identifiable PTH derivatives. The kit, containing 100-ml. portions of derivatives of 20 amino acids, costs $90.

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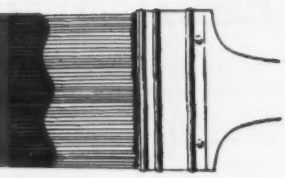

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Atomic Aim: Cooperation, Not Competition

The perennial question of balance between government-controlled activities and private-industry participation in the nuclear processing field was one of the most discussed subjects at last week's joint meeting of the American Nuclear Society and the Atomic Industrial Forum at Washington, D.C.'s Sheraton-Park Hotel.

Key topics rehashed by industry executives and Atomic Energy Commission experts, both in formal meeting presentations and in informal corridor conferences, included these needs:

- Greater use of privately financed fuel-processing plants to supply a larger share of AEC's fuel-cycle requirements.
- Re-evaluation of AEC's national laboratories setup to eliminate government duplication of development programs that private industry could carry out.
- Revision of the raw-materials procurement program, under which AEC is still letting contracts for new mills while some existing mills are running at only one-third of capacity.

Key to Efficiency: AEC holds the key to the economic development of commercial fuel-processing operations, said Sylvania-Corning Nuclear Corp.'s Garth Edwards, because it offers the only potential market with any sizable volume over the next years. The major problem of private fuel processors is the lack of sufficient commercial volume to enable them to approach optimum manufacturing efficiencies.

A certain amount of plant and equipment is needed to produce even small amounts of material at any stage of the fuel cycle, from the upgrading of yellow-cake concentrate, through feed material preparation and conversion of uranium hexafluoride into oxide or metal, to final fuel-element fabrication. And administrative costs for criticality, accountability, insurance, etc., must also be incurred. Increased volume wouldn't boost these costs appreciably, said Edwards, but it would permit considerable reduction of unit costs.

Commercial processors may find it difficult at first, Edwards added, to quote prices as low as those of larger government-owned contractor-operated facilities. But the extra volume of AEC business would likely enable them to bring fuel prices down to competitive levels sooner than they could from commercial fuel business alone.

In support of his proposal, Edwards cited a recent Bureau of the Budget directive that states, in part, . . . "it may be found to be in the public interest to purchase the product or service, regardless of cost factors, in order to foster or maintain the development or growth of commercial production facilities to meet ultimate governmental and nongovernmental needs at potentially lower costs."

Another cost-cutting measure suggested by Edwards: relaxation of too strict requirements for radiation protection and criticality safeguards. Supersafety provisions do not seem justified when compared with the cost, said Edwards, and especially when ultrasafety is already built into the criticality procedures.

"Either we are a hazardous industry, and should get indemnification, or we are not, and should not have to conform to undue safety controls and incur sizable and unnecessary costs, which add considerably to the cost of fuel," he said.

Labs Dominate Field: Another problem faced by private nuclear processors, said Chauncey Starr, vice-president and general manager of North American Aviation's Atomics International Division, is the growth of national laboratories. Despite the creation of—and considerable capital investment in—highly qualified development groups by private industry, the role of national laboratories in nonmilitary developments of atomic energy has not diminished. As a result, the atomic industry finds itself in direct competition with the national laboratories for government support, said Starr.

AEC now has a $1-billion investment in national laboratories, with annual operating expenses of about $500 million/year. If the international situation warrants reduction of weapons development, said Starr, the government must either shift limited, nonmilitary funds to the national labs, with a consequent reduction of industrial support, or reduce the national labs' efforts so as to support industry.

Industry's recommended solution: place engineering, research and development in the hands of industry, which has the ultimate responsibility of manufacturing and selling atomic power equipment. And let the national labs concentrate on providing the new scientific and engineering information needed to advance the program.

A sound, economic, commercial, profit-motivated and profit-rewarding business will be created, said Starr,

Nuclear processors build a case for:

- **Greater utilization of commercially produced nuclear fuels for AEC reactor programs.**
- **Less competition between national laboratories and industry, better balance of government and private development efforts.**
- **Development of chemonuclear reactors for large-volume output of irradiated chemicals at low cost, low radioactive contamination.**

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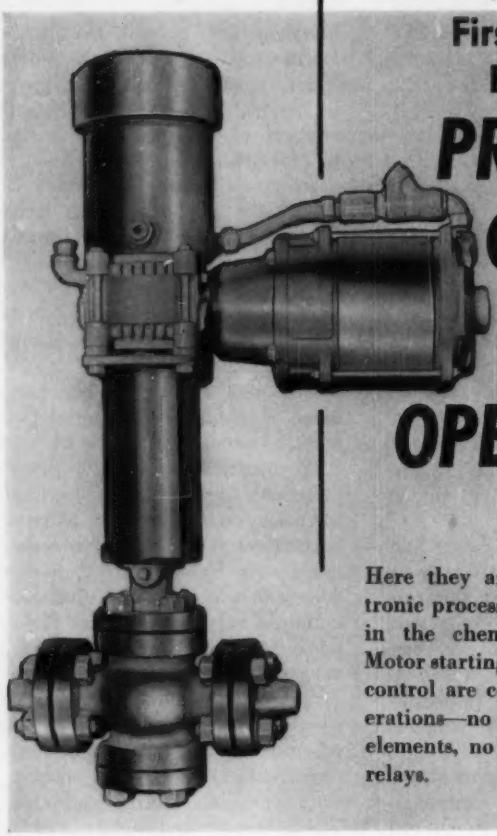

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Reactor Prospects: Looking ahead to the potential payoff of joint government-industry efforts to commercialize nuclear power, Frank Pittman, director of AEC's Division of Reactor Development, summarized the latest evaluation of eight major reactor concepts.

Based on operating experience resulting from the first five years of the U.S. nuclear power program—and omitting the improvements that may result from hoped-for, but unproved, modifications—the studies indicate:

- No reactor based on today's technology can compete with conventional systems using fuel costing less than 54¢/million Btu.
- Six of the eight reactor systems now being studied can become competitive with conventional plants using fuel at 35-40¢ million Btu. Of the six, the pressurized-water system is accorded the best chance of becoming competitive at an earlier date.
- Water systems with nuclear superheat and organic systems are about equal in power cost, time required to reach potential, and development costs needed to attain competitive goals. Other systems will require one to four years longer, two or three times as much development effort.

Pittman closed by cautioning against the too literal interpretation of these figures, since they include "a fair share of technical and scientific judgment." The importance of this caution was underscored by a later discussion of the effect of early performance trends and long-term economic factors of fuel cycles by E. L. Zebroski of General Electric's Atomic Power Development Dept.

In general, said Zebroski, projections are good only for "morale, getting contracts and long-range planning." To get usable cost estimates, practical experience is still necessary.

Current intensive development of large boiling-water reactors is expected to result in fuel-cycle costs of about 2 mills/kwh.—with the largest improvement coming from a 50% reduction of fabrication costs and increases of fuel lifetime and specific power. At that cost level, said Zebroski, no single element of

cost predominates. Further fuel-cycle reductions for nuclear plants built in the '60s may come from other changes, such as depletion costs and processing costs. For example, a downward trend of 30-50% in fuel-reprocessing costs can be expected, he added, when reprocessing volume reaches the 2- to 5-tons/day range.

Radiation Processing: Reviews of chemical processing applications for ionizing radiation indicate that large-scale uses of radioisotopes by the processing industries are still a long way off. Paul Aebersold, director of AEC's Office of Isotope Development, reported that commercial-scale production of graft copolymers by irradiation "appears imminent," stressed the need for more process application research.

Of greater interest to potential radiation processors were Aebersold's comments on the prospects for chemonuclear reactors—systems in which the chemical products are irradiated directly by fission energy within the reactor core.

Potential advantages of chemonuclear reactors: minimum radioactivation and contamination of products; maximum utilization of reactor power as ionizing radiation; low-cost irradiation energy—in the range of a few cents/kwh.—for chemicals handled in sufficient bulk to utilize the system's huge production capacity.

As a result of the interest shown by processors, Aebersold predicted that the "chemonuclear reactor program will increase sharply."

Some existing reactor systems are capable of providing radiation energy for chemical processing. A sodium-cooled power reactor, planned for construction in the U.S., could provide the equivalent of 4 megacuries of sodium-24 at relatively small cost, said Aebersold. A 250-megawatt reactor would provide a dose rate of up to 200,000 rad./hour. Organic-moderated reactors also have processing capabilities. It's estimated that a 20-mw. organic system, using 7-8% of fission energy as ionizing radiation, could process more than 1 million megarad-lbs./hour of fluidized material at a radiation cost of about 10¢/kwh. Inclusion of cadmium in the core would "filter out" slow neutrons, thereby reduce product radioactivation.

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nuclear systems, said Aebersold, has centered on a process for the production of nitric acid from oxygen and nitrogen (nitrogen fixation experiments are currently being performed in dynamic loops in Brookhaven National Laboratory's reactor). Other process possibilities: production of glycol from methanol; synthesis of acetylene from methane.

Russian interest in chemonuclear reactors is also running high. During his tour of AEC installations last week, Vasily Emelyanov, director of Russia's Main Administration for Utilization of Atomic Energy, told *CW* that Soviet engineers "are hopeful of combining power stations with chemical plants." A major program in Russia now includes the construction of a new reactor specially designed to produce gamma radiation for chemical processing.

As for chemical applications, Emelyanov confirmed Russian interest in ammonia synthesis by irradiation, but declined to discuss details or other specific chemical goals. He said only that the time schedule calls for completion of a commercial-scale nuclear chemical-electrical plant in one to two years. And if this scheme proves successful, he added, it will be adopted "on a broad scale."

Lithium Cleanup

A new lithium purification technique has opened the door to a new and potentially large-scale use of this low-melting alkali metal as a coolant for nuclear reactors and in other types of heat-transfer systems.

The technique, developed by E. E. Hoffman of Oak Ridge National Laboratory's Metallurgy Division, employs three steps—filtration, gettering by an active metal, and cold-trapping — to remove corrosion-causing nitride and oxide impurities.

Lithium possesses many properties that recommend it as a high-temperature, high-performance heat-exchange medium. But the severe corrosion caused by lithium at elevated temperatures has been a serious stumbling block.

To begin with, typical batches of commercial "high-purity" lithium were found to contain from several hundred to several thousand parts per million of nitrogen and oxygen.

Three-Step Route: Basic differ-

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Titre	36° – 41°F.	36° – 41°F.	37.4°F. max.	39.2°–42.8°F.	46.4°–50.0°F.	64.4° – 68°F.
Color 5¼" * Lovibond Red	1 max.	1 max.	1 max.	1 max.	1 max.	2 max.
Color 5¼" * Lovibond Yellow	8 max.	8 max.	10 max.	10 max.	10 max.	15 max.
Color Gardner 1933	2 max.	2 max.	—	—	—	—
Unsaponifiable	1.0% max.	1.0% max.	1.5% max.	1.5% max.	1.5% max.	1.5% max.
Saponification Value	199 – 204	201 – 206	198 – 203	198 – 203	198 – 203	204 max.
Acid Value	198 – 203	200 – 205	197 – 202	197 – 202	197 – 202	203 max.
% F.F.A. as Oleic Acid	99.5 min.	99.5 min.	99 min.	99 min.	99 min.	99 min.
Iodine Value (WIJS)	95 max.	90 max.	95 max.	94 max.	92 max.	85 max.
Refractive Index 50°C. (Average)	1.4500	—	1.4505	1.4500	1.4495	1.4485
Total Polyunsaturated Fatty Acids	—	3.5% max.	—	—	—	—
COMPONENT FATTY ACIDS						
C14 Myristic	5%	6%	5%	5%	5%	5%
C16 Palmitic	3%	2%	4%	5%	6%	10%
C18 Stearic	1%	—	1%	1%	2%	4%
C18 Oleic	82%	89%	80%	79%	77%	72%
C18 Linoleic	8%	2.5%	9%	9%	9%	8%
C18 Linolenic	1%	0.5%	1%	1%	1%	1%
MACKEY TEST: Time to reach 105°C.	over 7 hrs.	over 7 hrs.	over 4 hrs.	over 4 hrs.	over 4 hrs.	over 3 hrs.

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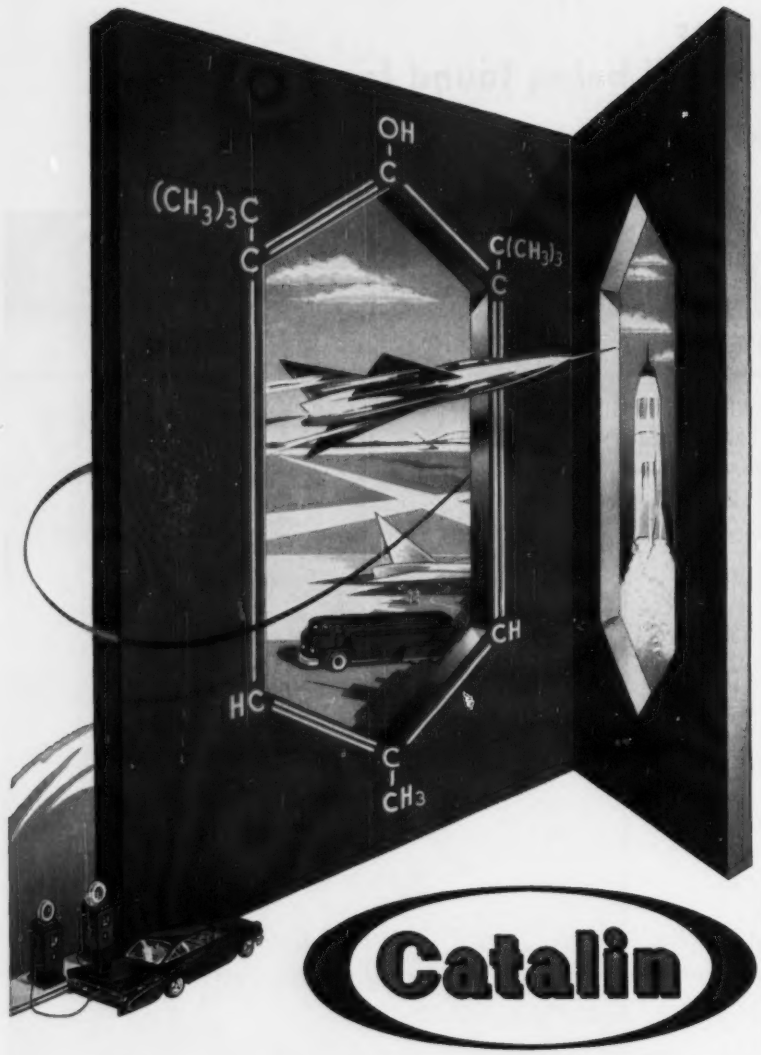

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ENGINEERING

ences between the physical properties of lithium oxide and lithium nitride prevent satisfactory purification by a simple one-step method. Here's how the combination of three operations does the job:

- Filtration of gas-packed, commercial lithium at 250 C removes gross amounts of nitrogen and oxygen. This step alone can reduce oxygen from as much as 5% (by weight) to about 100 ppm., but nitrogen solubility at the filtration temperature is about 400 ppm.
- Gettering with an active material — e.g., titanium sponge — at 800 C for 24 hours or more drops nitrogen content to less than 100 ppm. Used alone, this method is the most efficient, and least costly, for reducing nitrogen content to 50 ppm. or lower; but it has little effect on the oxides. By substituting yttrium as the getter, oxygen can be reduced to the 100-ppm. range by prolonged exposure (up to 100 hours).
- Cold-trapping completes the purification by reducing oxygen to less than 100 ppm., but provides no additional removal of nitrogen.

It's still too early to predict whether high-purity lithium has a big future, says Hoffman. But the availability of an efficient purification technique will clear the way to any new applications that require its special properties.

PROCESSES

Aluminum Refining: Max Planck Institute for Coal Research in Mannheim-Ruhr, Germany, has developed a new process for the electrolytic production of aluminum. The process is similar in principle to the new tetraethyl-lead process of Karl Ziegler (*CW, June 13*), purifies aluminum by the electrolysis of a complex electrolyte—sodium fluoride, triethyl aluminum, and diethyl aluminum hydride.

•

Diosgenin: The Regional Research Laboratory at Jammu, India, has developed a new method of extracting diosgenin, a raw material for steroid hormones, from barbasco root (*dioscorea deltoidea*). Powdered root tubers are dissolved in a dilute mineral acid, the diosgenin extracted by common organic solvents. Yield is said to be 3.7% with an extraction efficiency of about 91%.

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(MOST EVERYONE IS)

Here's your guide:

U. S. Uscolite® CP acrylonitrile-butadiene-styrene copolymer (ABS-I) pipe is best where maximum resistance to impact is demanded. It will safely handle most chemicals of industrial importance at working temperatures up to 170°F. This is the major plastic pipe used by chemical processing industries.

U. S. Uscolite RV polyvinyl chloride (PVC-I) pipe is best for extremely active oxidizing agents such as strong sulphuric, nitric and chromic acids. This unplasticized, unmodified Type I PVC has high impact strength and handles temperatures up to 140°F, far in excess of normal requirements.

Uscolite HT (ABS-II) pipe is a new addition to the resin-rubber compounds. HT stands for exceptionally High Tensile qualities, plus much better retention of physical properties at High Temperatures.

These types of Uscolite Pipe cover all requirements, not only because they are virtually immune to internal and external corrosion, but they are non-contaminating, odorless, impart no taste or discoloration. Because of these qualities they are approved by the National Sanitation Foundation for carrying drinking water. The use of Uscolite results in a saving of appreciable dollars in installation costs and reduction in man-hours. The skills to install metal pipe are not required to install Uscolite. Assembly can be accomplished in half the time. *Not one foot of Uscolite Pipe has ever failed in service when used in accordance with our recommendations.*

A fourth pipe, *UscoFlow HT (ABS-II)* is a black utility pipe, especially suitable where low first costs are a factor. It's a blend of styrene-base resin and synthetic rubber for good impact resistance and high tensile strength. UscoFlow is the ideal answer to builders and large developers who are seeking long-lived, maintenance-free pipe for plumbing.

We invite detailed inquiries or call your "U. S." plastics distributor. He has the *largest* line of plastic pipe and fittings, plus an experienced background to settle any and all questions about which pipe to use.

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Technology
Newsletter

CHEMICAL WEEK
November 21, 1959

Synthetic naphthalene from petroleum may soon be a reality. Ashland Oil & Refining is going to put up a plant at its Buffalo, N.Y., refinery to make a maximum of 50 million lbs./year of naphthalene or 12 million gal./year of benzene, or a combination of the two products. It will use a hydrodealkylation process developed in its own labs. Universal Oil Products, which gave out details of the process at the API meeting in Chicago last week, will license it as Hydeal.

At least three refiners have developed methods of making naphthalene from petroleum streams (*CW, Aug. 25, '56, p. 60*). Apparently none was willing to build a plant until it was able to land a contract with a big maker of phthalic, such as Allied or Cyanamid. Ashland, however, is convinced that the economics of its process will enable it to sell naphthalene in competition with the coke-oven material. It points out that the high-boiling (over 350 F) products in reformate are usually 90% aromatic. This material, it adds, makes an attractive feedstock for the process.

The process will convert alkyl benzenes (toluene, xylenes, etc.) into benzene, alkyl naphthalenes to naphthalene. Ashland feels that the long steel strike has pointed up the need of a non-coke-oven source of naphthalene.

The firm describes its project as the first one to produce "synthetic benzene and naphthalene from petroleum." At present, of course, a great deal of benzene is produced in catalytic reformers by dehydrogenating cyclohexane, and by ring enlargement (followed by dehydrogenation) of methyl cyclopentane. Ashland explains its process will be the first to produce it by dealkylation.

Ashland has supplied decahydronaphthalene with small amounts of diethylcyclohexane to the Air Force for investigation as a jet fuel (*CW, Aug. 22, p. 22*). Raw-material naphthalene was coke-oven material. The company says that there is no direct tie between its fuel program and decision to build the Buffalo plant. But if need for the fuel should go up, doubtless Ashland would use its petroleum-derived naphthalene.

•

Secrets of synthetic diamond-making are out this week. General Electric, newly free of a government secrecy order, reveals that a molten metal catalyst—chromium, manganese, iron, cobalt, nickel, ruthenium, rhodium, palladium, osmium, iridium, platinum or tantalum—is the key to the process. Pressures (800,000-1.8 million lbs./sq. in.) and temperatures (2200-4400 F), about the ranges originally disclosed for the GE diamond-making apparatus (*CW, Feb. 26, '55, p. 62*), are used to convert carbon into diamond in the presence of the catalyst metal. Best results are with pure graphite. But other carbonaceous materials, such as carbon black or sugar charcoal, can be used.

The molten metal catalyst forms a thin film between the carbon and the growing diamond crystal. Without it, 3-million-lbs./sq.in. pressure

and temperatures over 7000 F (a sustained combination that is unattainable at present) would be required. Diamond formation takes place "within a few minutes," says GE.

In GE's press, conical pistons, much stronger than cylindrical types, push into each end of a "belt"-shaped reaction chamber (which gets its name from the stressed binding rings that support it).

Shape and other characteristics of GE's synthetic diamonds can be tailored to fit special cutting, grinding and polishing applications. The diamonds are yellow to white, if made at higher temperatures, black at low temperatures, with shades of green in between. They're better than natural diamonds for industrial work, says GE, but still too small for gem uses.

•

A new refining process—dubbed Unicracking—has been developed by Union Oil Co. of California. It's designed to improve conversion of low-quality distillate fuels into high-quality gasoline, jet fuels and diesel products. Claimed advantages: simplicity, production of total product in greater volume than the feedstock, flexibility in varying percentage of gasoline and diesel oil products, elimination of low-value cracked fuel oil by-products.

Unicracking appears similar in several respects to Cal Research's recently disclosed Isocracking process (*CW, Oct. 24, p. 38*). Both methods, for example, boast a rugged, long-life catalyst. It's claimed that the Unicracking catalyst can be run continuously for several months between short periods of catalyst regeneration. Union Oil declines to comment further on process details or plans for commercialization.

•

Add Centrol S-41-K to the growing list of gasoline additives. The newcomer, developed and produced by the Chemurgy Division of Central Soya Co., Inc. (Fort Wayne, Ind.), is a modified phosphatide completely soluble in gasoline and compatible with other types of additives. It was originally developed as a carburetor detergent, was later found to provide anti-icing protection resulting from its synergistic action with other phosphorus compounds. At the suggested concentration of 50 ppm., 25¢ worth of new additive is said to treat more than 1,000 gal. of gasoline.

•

A five- to ten-fold surface-life increase for zinc auto parts is staving off budding competition from aluminum, stainless steel and plastics, according to plating experts at last week's American Zinc Institute symposium in Detroit. Improved copper-nickel-chromium plating techniques resulting from research by Harshaw, Metal & Thermit, Battelle and others are behind zinc's rally. Plated zinc die castings are used in tail and headlight housings, grills, door and window handles, and the like—and can amount to as much as 70 lbs./car. At least one or a combination of various new plating systems will be used on all '60 cars, speakers at the meeting disclosed.

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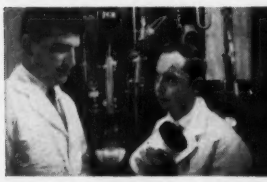
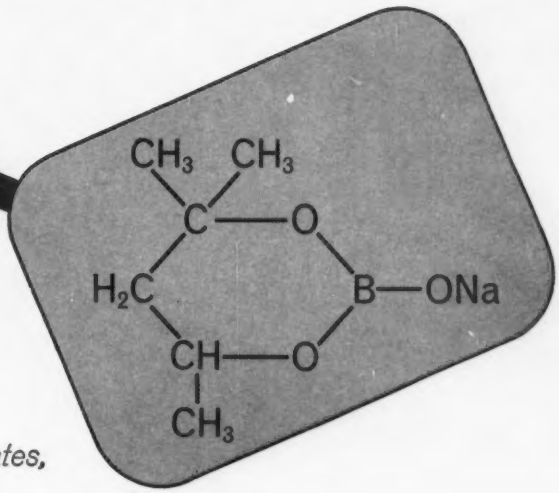


Sodium Hexylene Glycol Monoborate

Take a closer look at this formula!



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TECHNICAL DATA

FORMULA WEIGHT..... 165.98
% BORON..... 6.5
% SODIUM..... 13.8
BULK DENSITY..... 0.25 $\frac{g}{cc}$
SOLUBILITY: Soluble in oils, gasoline, toluene, benzene, heptane, dioxane, ethers, and others.

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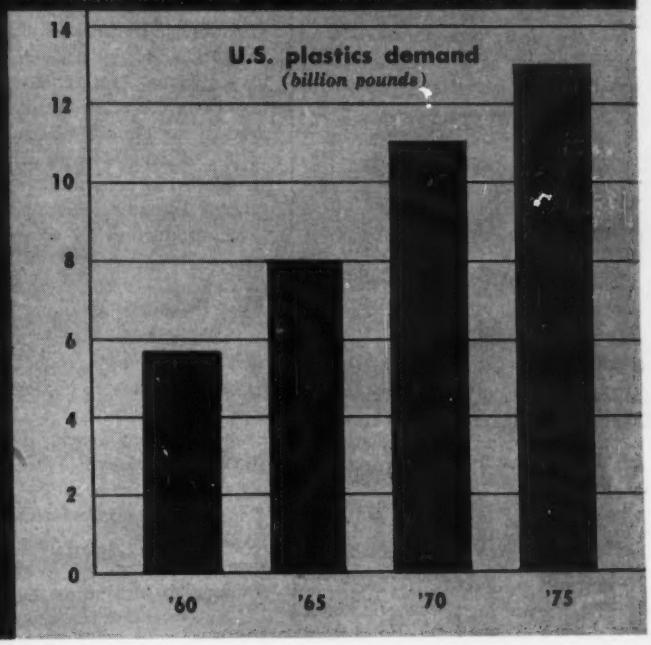
'59 plastics boom . . . sets the pace for growth

U.S. plastics output

	Million Pounds Jan.-June '59	Increase over Jan.-June '58
Polyethylenes	562.6	37.5%
Vinyls	548.3	52.6
Styrenes	452.1	41.9
Phenolics	286.5	37.0
Urea-melamines	201.5	32.9
Alkyds	200.9	21.5
Coumarone-indene and petroleum polymer resins	129.0	15.0
Polyesters	80.0	43.7
Cellulosics	78.1	17.1
Rosin modifications	68.8	18.8
Epoxies	26.5	21.5
Miscellaneous	120.8	53.2



Plastics Forecast: Double Demand by 1970

The U.S. plastics industry rebounded from the '58 recession with whopping big sales and production increases in all areas during the first half of '59 (see chart above). Convinced that '59 will round out as a banner year, CPI plastic marketers are looking into the next decade, are coming up with more cheering news for the industry.

Forecasting where the complex plastics industry will be 10 years from now is admittedly tricky, but plastics experts appear well agreed that total demand will come close to an 11-billion-lbs./year level by '70—about double current usage. Along the way, plastics consumption should pass the 8-billion-lbs./year level in '65.

Polyethylene, of course, continues to pace all other plastics. This year, it will likely edge ahead of vinyls as production of both exceeds the 1-billion-lbs./year mark for the first time. Polyethylene is expected to rack up a 1.15-billion-lbs. market in '59 (865 million in '58); vinyl and its co-polymers should hit about 1.05 billion lbs. (870 million in '58).

Although there's wide agreement about polyethylene's probable score in '59, industry experts find it harder to match views on PE's long-term future. In part, perhaps, PE predictions are made difficult by the still-to-be-felt competition from polypropylene.

More-conservative forecasters put PE demand still shy of the 2-billion-lbs./year mark in '65, don't foresee 2.5-billion-lbs. consumption until '75. But many are more optimistic, figure PE will pass the 2-billion-lbs./year level by '65.

Other Plastics: Plenty of forecasts on other plastics have been bruited about trade channels during the past few months. Some samplings: polystyrene: 860 million lbs. by '65; phenolics, 600 million in '65; polyesters, 200 million in '60 and 230 million in '65; epoxies, 75 million in '61 and 90 million in '63.

But most of these preliminary forecasts should be considered with caution until accurate '59 totals are available as a base upon which to predict future growth. Earlier forecasts were doubtless colored by uncertainty about what would happen in '59.

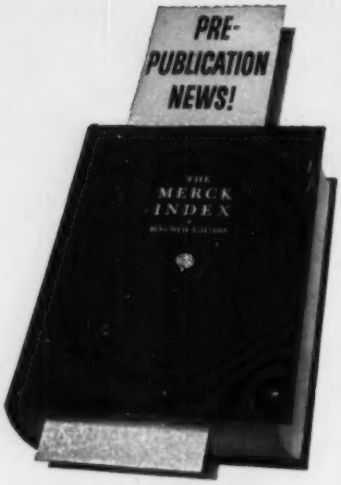
The 860 million lbs. of polystyrene production predicted for '65 may, in fact, be exceeded this year; but whether '59 output represents regular growth or an abnormal peak is moot.

Debated, too, is the size of the vinyls market for surface-coating applications; forecasts for '63 are 130 million lbs. to well over 300 million.

The more optimistic outlook may be based partly on expectations of big gains in use of vinyl-coated metals. Earlier this month, Edward Osborne, market manager of B. F. Goodrich Chemical Corp., told the nation's metal experts that vinyl-coated metal is now moving into a "fabulous" market. He notes that 30 million sq. ft. of vinyl-coated metal sheets and coils were produced in '58—about 50 million sq. ft. will be made in '60.*

Depth Probe on Coatings: The role of synthetic resins in production of coatings was analyzed in depth last week at the Chemical Market Research

*Vinyl-coated metal will compete primarily against alkyds and baked enamels. A measure of the total market potential ('58 use estimates): home appliances, 175 million sq. ft. of metal; kitchen cabinets, 30 million; office equipment, 4.5 million; luggage, 75 million.



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Assn. meeting at the Sheraton Towers Hotel in Chicago. Here's how M. H. Bigelow, vice-president of Allied's Plastics and Coal Chemicals Division appraises the coatings situation:

Although he predicts that phthalic anhydride and polybasic acid types of alkyd coating resins have made a comeback in '59—production will amount to almost 490 million lbs., compared with 440 million in '58—he figures '59 consumption won't pace output. Inventory buildup has taken place, production will soften when the steel strike is settled.

Comparing specific types of materials, Bigelow notes that output of phthalic anhydride-type resins averaged 30 million lbs./month in the first half of '59; this compares with 33.3 million lbs./month in '55. On the other hand, output of maleic, fumaric, and phenol-formaldehyde types was 10% higher in '59 than in '55.

Bigelow's gloomy forecast: despite alkyd's "good year," these materials have an "inherent weakness" and will continue to lose ground unless some good alkyd emulsions are discovered. Alkyd resin consumption for coatings is expected to increase from 487 million lbs. in '58 to 580 million in '65 (consumption in peak year '55 was 569 million lbs.).

Bigelow's forecast for '65 consumption of the alkyd-based paints: industrial, 345 million gal.; trade "interior" paints, 95 million gal. This compares with 294 million gal. for industrial and 77 million gal. for trade use in '58.

Here's how Bigelow figures other coating markets will shape up in '65, compared with '58: Total consumption of binder resins for latex paints will increase to 200 million lbs. in '65, from 130 million in '58. In this period, consumption of polyvinyl acetate emulsions will increase to 50 million gal., from 19 million in '58; acrylic emulsions will increase to 70 million, from 8 million in '58. However, a sharp decline is expected in styrene-butadiene emulsion use—from 38 million gal. in '58, to 10 million in '65.

Use of phenolic surface coatings will decline from 38 million gal. in '58, to 35 million in '65 (1 lb. resin/gal.). The market for epoxy-based paints will about double in this period, from 12.5 million gal., to 23 million (2 lbs. resin/gal.). Polyvinyl chloride lacquer demand will increase from 15 million gal. in '58, to 20 million in '65. The optimistic outlook for urethane coatings: 850,000 gal. in '60, 1.6 million in '61, 3.3 million in '63, and 5.8 million in '64.

Other Markets: CMRA speakers pinpointed future market prospects in other consuming industries. D. D. Lanning of Du Pont's film dept. predicted that the industrial market for films will double around '65, reaching a 600-million-lbs./year rate. Polyethylene, polyesters and vinyls are expected to lead the way. In the packaging field, film demand is expected to be 1 billion lbs./year by mid-'60s.

Thomas DeMarco of Monsanto emphasized that, despite touted gains by plastics in the construction field, plastics' share in total construction is small, compared with gains by all types of materials used. One reason: most plastics applications are for surfacing; large-volume usage will come only if plastics are pushed into more basic structural elements.

Best "conservative" outlook for plastics in '65, envisioned by DeMarco, is a 1.3-billion-lbs. demand. If a breakthrough is made, it might double or triple estimated demand.

Clive Eustace of Plax Corp. spelled out the '65 outlook on plastic bottles, tubes, shipping containers. His predictions: the market should grow to well over 100 million lbs. by '65. Flexible bottles, tubes and industrial containers currently use about 27 million lbs. of low-density polyethylene, will take an estimated 30 million lbs. in '61. More rigid containers will push the use of high-density polyethylene from an "almost negligible" amount in '58, to more than 35 million lbs. in '60 and to 50 million in '61. After '61, polypropylene and possibly other polymers will begin to gain sizable volume in carrier markets.

Dow Chemical's W. C. Goggin estimated the future market for flexible foams, indicated to what degree the synthetic materials might replace old-time conventional materials, e.g., cotton batting.

He figures that the total potential market for '65 breaks down this way (million cubic feet): automotive, 35; furniture, 21; mattresses and pillows, 72; miscellaneous, 14. Total: 142 million cu. ft.

Actual expected penetration of those potential markets (million cubic feet): automotive, 24; furniture, 15; mat-

BRIEFS

on some recent developments in sodium chlorate...an easy way to get benzyl groups... what to look for in muriatic acid specs

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What to look for in muriatic acid specs

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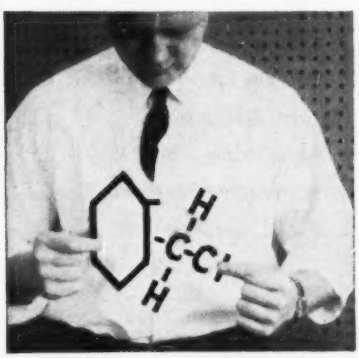

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tresses and pillows, 50; miscellaneous, 11. Total: 100 million cu. ft.

Goggin went on to spell out a similar potential-vs.-actual market for rigid foams in '65. The estimated potential (million cubic feet): industrial buildings, 60; domestic buildings, 30; equipment, 30; appliances, 50; miscellaneous, 10. Total: 180 million.

Expected consumption of rigid foams in '65 breaks down this way (million cubic feet): industrial buildings, 30; domestic buildings, 20; equipment, 15; appliances, 30: miscellaneous, 10. Total: 105 million.

The plastics industry is obviously standing on the threshold of a big decade. Demand for most established materials is likely to grow significantly —but in the face of increasingly rough competition from both new materials and old products.

Glycol Threat Ahead?

Several U.S. glycol producers last week put voice to a fear that foreign glycol makers—whose total capacity is rapidly catching up with Europe's domestic demand—will probably open the valves wide and pour their excess into the U.S. next year.

One U.S. observer, who admits to being "plenty worried," puts Europe's glycol surfeit at about 10,000 tons/year, expects that this volume will be dumped here at low prices—and will probably unsettle the market.

To top this, another foreign glycol expansion is slated to occur within the next five years.

Biggest worry centers on ethylene glycol, since the propylene glycol supply/demand situation in Europe is now "nicely balanced." But expansions of propylene glycol capacity could also, it's believed, lead to subsequent dumping of this chemical in the U. S.

Another U.S. glycol seller adds this unsettling thought: the U.S. glycol situation will become especially acute because the European import market for glycols from this country —which formerly took a substantial part of U.S. output—is rapidly petering out (*CW, Nov. 1, '58, p. 77*). Moreover, it's noted that some U.S. glycol "has slipped behind the Iron Curtain," that this market would also probably be lost.

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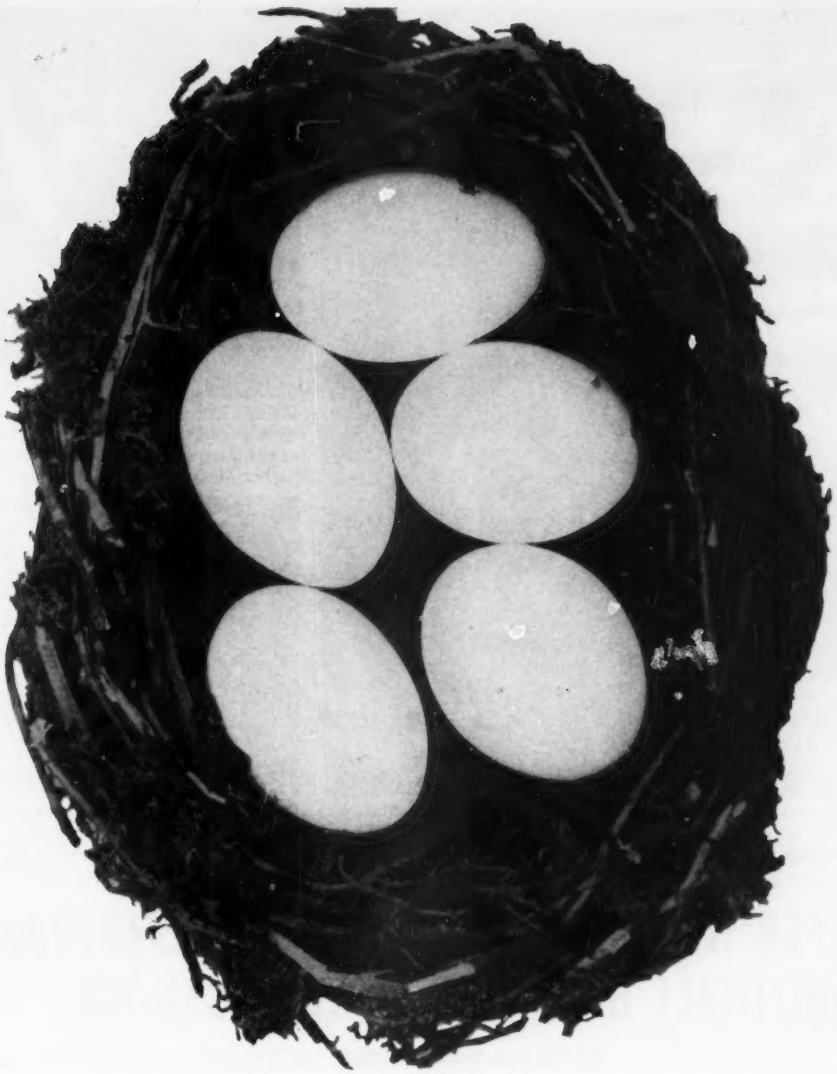

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Market Newsletter

CHEMICAL WEEK
November 21, 1959

Copper chemical prices continue to push upward. Prices on two more copper-derived chemicals were boosted last week. Copper hydrate tabs advanced 1¾¢/lb., while black copper oxide was up 1½¢/lb. Reportedly, some copper chloride quotes have gone up.

Reason for the price increase: the higher price of copper metal, due to prolonged strikes. Prestrike tabs on primary copper fluctuated between 25-30¢/lb. However, base price is now around 33¢/lb., with spot quotes around 40-40½¢/lb.

Many chemicals can be made from secondary copper (recovered from scrap) but here the price moves upward in line with higher primary copper quotes, since there is essentially no difference between the two finished grades.

Some government copper stocks might be released with Congressional approval. This is a good guess in view of the explosive upward price reaction of world copper markets last week, added to the renewed pleas by domestic fabricators, asking for government relief of their shortages.

An understanding had existed between the Administration and mining-state congressmen that the government's overloaded stockpile would not be put on the market until the copper strike is over. But some stocks may be released, now that outlook for a strike settlement has improved (*CW, Oct. 24, p. 87*).

•

Compiling of government data on synthetic organic chemicals should remain in the domain of the U.S. Tariff Commission (*CW, Nov. 7, p. 33*), and should not be turned over to the Bureau of the Census as has been previously proposed. This is the position taken by the CMRA at last week's meeting in Chicago.

Speaking for the association's statistical committee, and apparently reflecting the majority view of the membership, CMRA President James Sayre urged that all members promptly send letters to their congressmen and to Maurice Stans, director of the Bureau of the Budget, protesting the proposed Tariff-to-Census switch.

Meanwhile, CMRA will delve further into the problem of obtaining more comprehensive and detailed chemical data. Plans are now under way to launch a questionnaire study, due shortly, to find out more about the specific problems involved in chemical statistics. One goal: to learn how CMRA can make better use of the Federal Statistics Users Conference, to help improve the quality of government statistics.

•

Chalk up more phenol capacity from a new producer. Shell Chemical has now begun making its own material at its Houston, Tex.,

chemical complex (*CW Market Newsletter, Nov. 7*). The new unit will be able to produce both phenol and acetone (via cumene). Both materials will be used in the manufacture of bisphenol-A—thus making the company basic in its epoxy resin raw materials.

Phenol capacity, both natural and synthetic, is already more than ample to meet demand. But Shell Chemical will use most of its output in production of epoxy resin and Shell Oil will take some of the production (probably for use as a selective solvent). Thus, the main impact of the move will be felt mostly by Shell's suppliers.

•

More propylene tetramer will also be coming from a new supplier. Monsanto's Lion Oil Division has started shipments from newly completed facilities at the El Dorado, Ark., refinery.

Initial output went to Monsanto's Inorganic Division plant at Monsanto, Ill., for use as an intermediate in the manufacture of synthetic detergents. The refinery will also supply other divisions of the parent company with petrochemical raw materials.

Propylene tetramer (dodecene) is second only to isopropanol as an outlet for propylene, since it consumes nearly 500 million lbs./year of propylene. Most of the tetramer finds its way into the production of dodecylbenzene sulfonates, the remainder being used in the oxo conversion into tridecyl alcohol, and for miscellaneous surface-active agents (*CW Propylene Report, Nov. 14, p. 58*).

•

Prices of phenylpropanolamine hydrochloride were reduced 50¢/lb., by Fisher Chemical. The new price, $9.50/lb., went into effect Nov. 15. Phenylpropanolamine hydrochloride is an antihistamine intermediate.

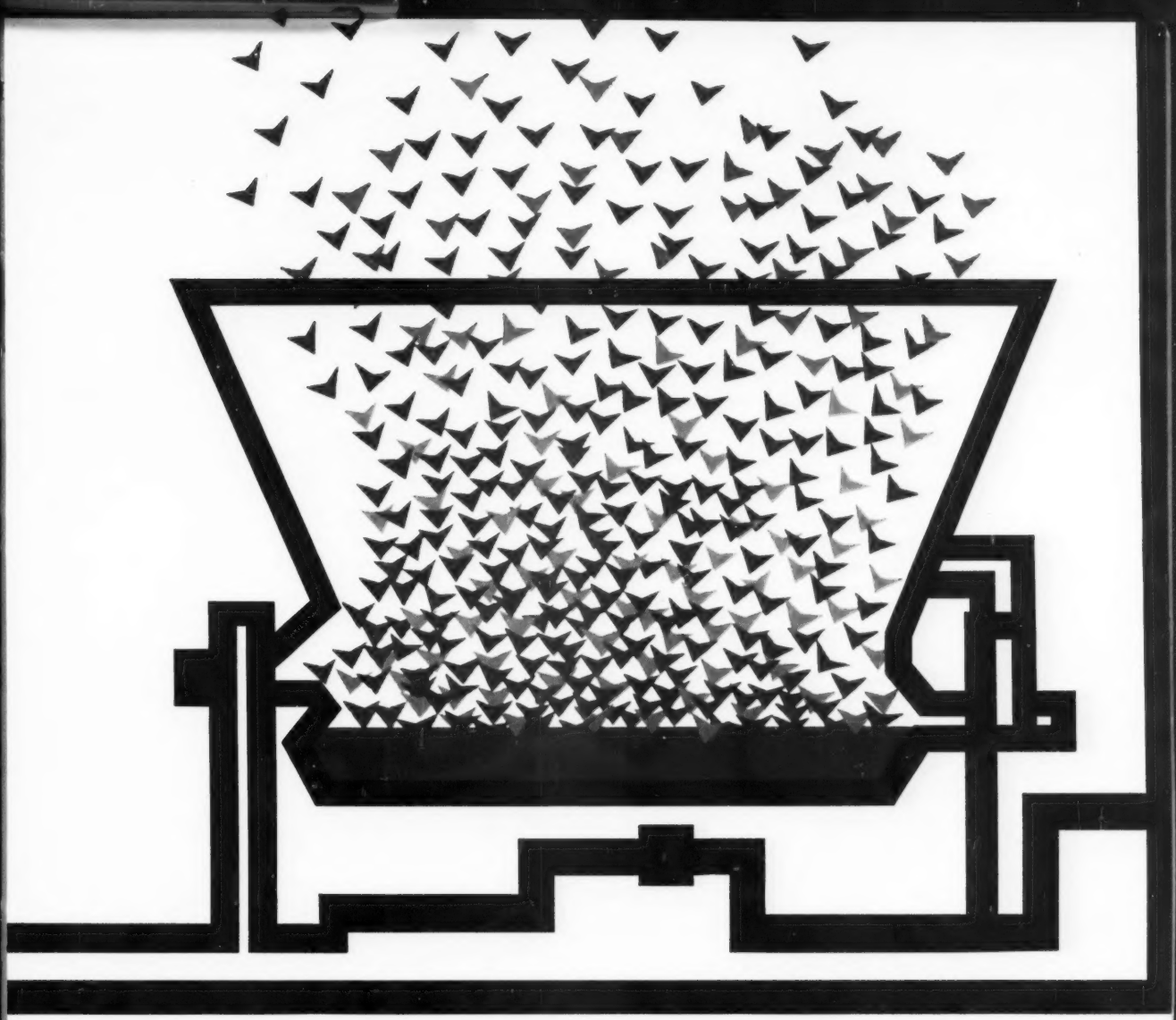
•

There's more oxygen and hydrogen onstream at plants of Linde Co., division of Union Carbide. Liquid hydrogen—available for the first time in northeastern U.S.—can be made at a 25,000-liters/month clip at Tonawanda, N.Y.; the oxygen-producing plant (capacity: 110 tons/day of high-purity gas) is at Lukens Steel's Coatesville, Pa., works. Most of the output will be used in open-hearth and electric furnace steelmaking.

SELECTED PRICE CHANGES—WEEK ENDING NOVEMBER 16, 1959

	Change	New Price
UP		
Copper oxide, black, bbls., works	$0.015	$0.4925
Copper oxide, red, 90%, USN-type, bbls.	0.015	0.485
Cupric chloride, anhyd., dms. wks.	0.0075	0.4475
DOWN		
Folic acid, USP, bots., 5 kilos or more, gram	$0.19	$0.44
N-methylaniline, tech., tks., frt. alld.	0.07	0.60

All prices per pound unless quantity is quoted.



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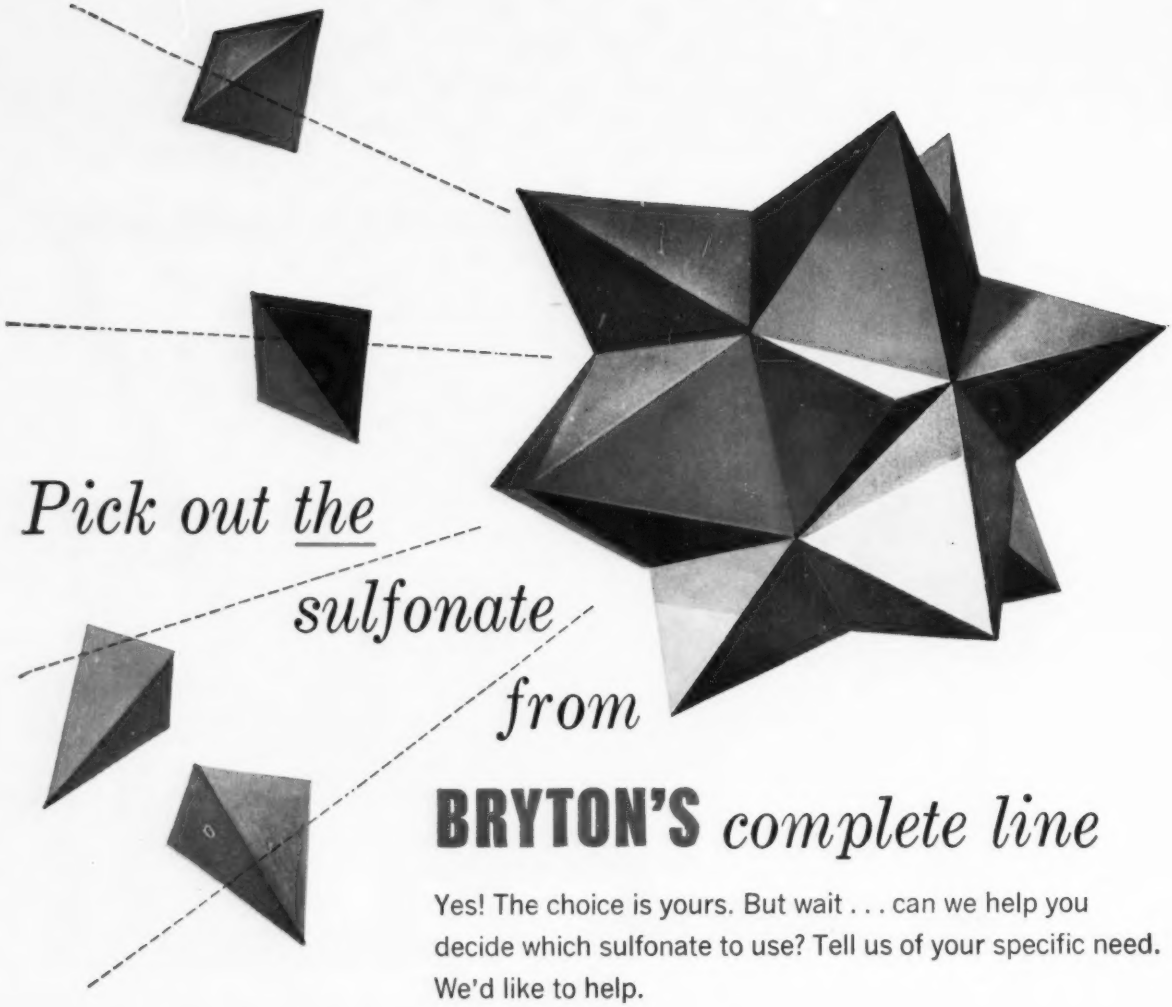

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	Bryton Sherosope F	465	62
	Bryton Sherosope T	500	62
	Bryton BOSS® 470	460	70
Barium Sulfonates	Bryton Hybase® Barium Sulfonate 65 Base No.	1010	47
	Bryton Barium Sulfonate 30-N 2 Base No.	1010	30
Calcium Sulfonates	Bryton Calcium Sulfonate 30-A	900	30
	Bryton Calcium Sulfonate 45	900	45
Ashless Sulfonates	Ammonium Sulfonate	450	35
	Amine Sulfonates	490 minimum	50

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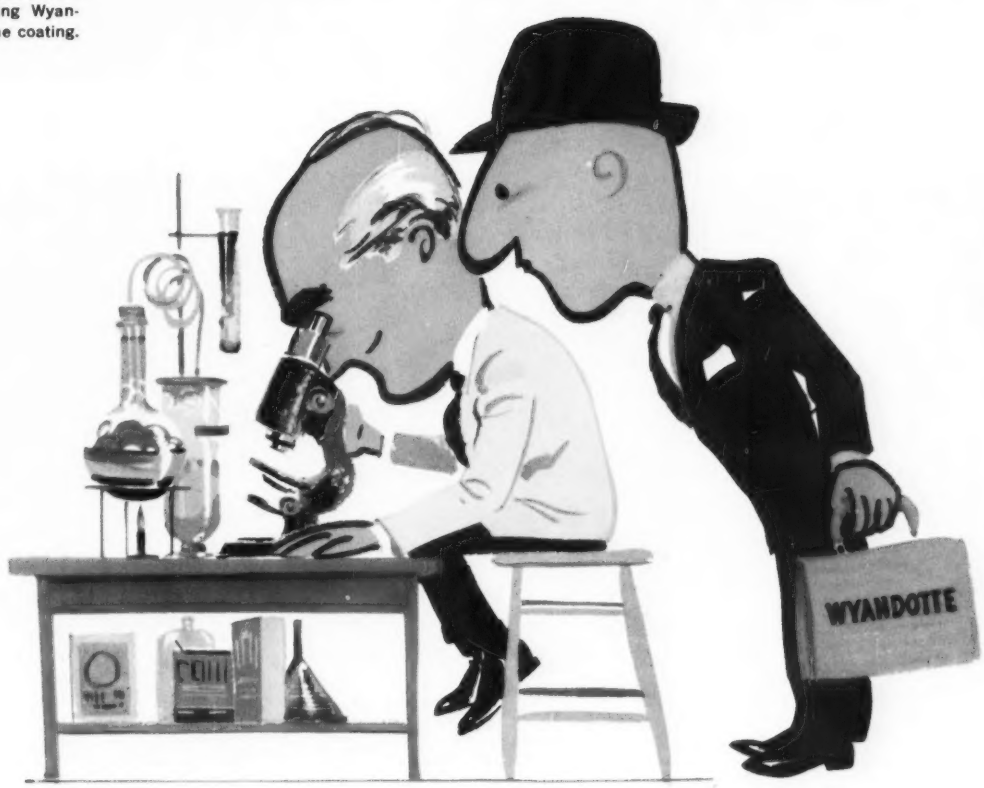

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2 Out on the tracks, he assists in all phases of safe handling procedures. Note the caution signs, safety platform, and flexible loop. These are just a few of the precautions that personnel handling chlorine should always follow to insure safety.

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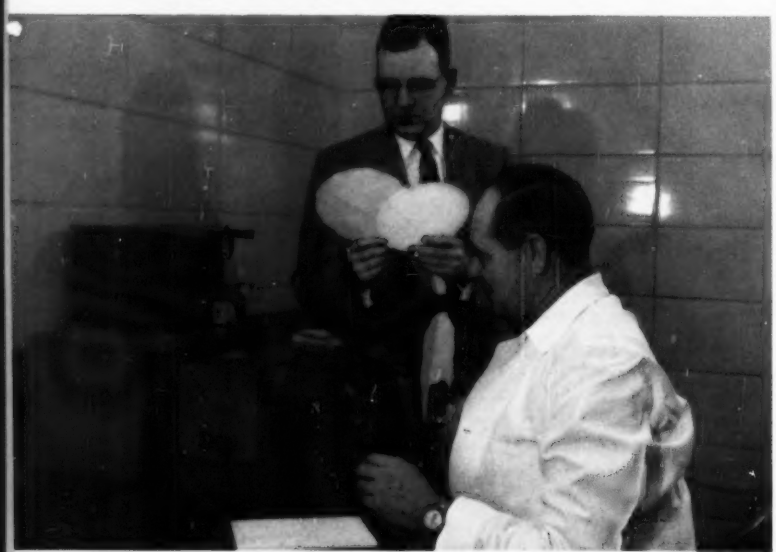

4 At the customer's mill, he inspects the bleach equipment. Here, his knowledge and experience gained in the laboratory are applied. A technical service man's work can take him anywhere . . . wherever there is room for progress or improvement.

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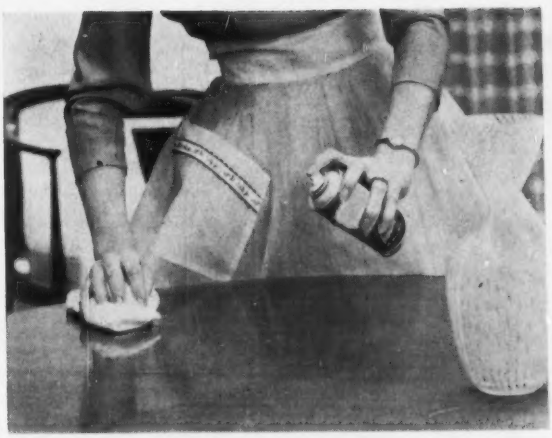
721

Pointers on the growing U.S. polish market

- **Furniture polishes will rack up $30-million sales this year.**
- **Powering their sales climb: growing acceptance of aerosol products and successful promotion of polishes for other-than-furniture uses.**
- **More aerosol products will be introduced soon, and self-polishing polishes are on the way.**



Aerosols Stem Tide of Lagging Polish Sales

Aerosol furniture polishes — now prime contenders in the $30-million/-year furniture polish field — got an extra boost a few weeks ago with Union Carbide Chemicals' first public showing of a new formulation for polish makers. A thick, shaving-cream-like polish, UCC's product is the latest twist on a type of polish that has already revitalized the uncertain furniture business.

Since S. C. Johnson entered its aerosol Pledge into the market about two years ago, the furniture polish market has doubled in annual dollar value. And the field is rapidly becoming a crowded one: Bon Ami Co. (New York) recently introduced Dust-N-Wax, a silicone product that retails at 69¢ for a 7-oz. can. Paramount Chemical Co. (Los Angeles) has a new push-button polish, Promise, selling in the West Coast market. And said to be ready to debut aerosol products are Simoniz Co. (Chicago), O'Cedar Division of American-Marietta (Chicago), and Renuzit (Philadelphia).

The pushbutton units have caught on well in the U.S. because they are easy to use. And polish volume has gone up. Not only has the housewife been willing to pay a higher unit price for the aerosols; she has also been persuaded to use the furniture polish on a host of items to which she would not have applied older-type furniture polishes.

Polish Chronology: The advent of aerosol polishes is just one of the rapid postwar changes that have come about in the polish field. In the last 15 years, more changes have been made in polish formulations than took place for hundreds of years before the war.

The first furniture polishes used in any volume were the hard-to-buff paste waxes made from beeswax and turpentine. They are still sold but now have only a small portion of the total wax market.

Next came the mineral oil-perfume combinations, such as so-called lemon and red oils. These also are still on the market. Their major advantage: they need not be buffed; their limitation: they don't provide a lasting shine.

Then cream polishes, with an added cleaning agent, came on the scene. They were considered an improvement, but often they left surfaces greasy and had poor gloss retention.

In '50, silicone-type polishes made their debut. They gave a harder, glossier finish but were more expensive—and there were some complaints about difficulty in removing them.

Up to this time, the polish market had remained relatively stable. But the introduction of new types of furniture —items topped with Formica, vinyl and chrome, all of which require little or no polishing—jolted the polish business. Sales fell from $14.8 million in '56 to $13.7 million in boom-year '57.

In fact, damage was so severe polish makers began to speed up research on aerosols, then in early stages of development. In '58, Johnson released Pledge, an aerosol "mist" or liquid, which cleaned and polished in one application. It was, moreover, suggested for use on virtually every type of new material being used in furniture as well as on regular wood finishes.

The market is said to be settling now, but at a much higher level than before. In fact, the industry's highest sales levels may have been reached. Some observers predict furniture polishes will be in serious straits if the trend to no-polish, permanent-finish furniture catches on. Although some polish will undoubtedly be used on such furniture, the volume will not nearly reach the amount used on wood surfaces.

Who's Who in Polishes: Wax giant S. C. Johnson (Racine, Wis.) has three major furniture polishes. Pride, introduced in '51, is a silicone-containing liquid wax. It produces a high shine with light buffing, contains a cleaning agent and is said to wipe dirt and fingermarks away during application. The firm's Cream Wax is recommended for hand-rubbed finishes and also has special cleaning ingredients to remove dirt and grease. (Johnson claims this polish differs from other

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cream polishes in that it contains no oils.) And the big seller, Pledge, recommended for nearly all finishes, is said to clean, dust and polish in one step.

Johnson also makes three other waxes that can be used on furniture: Paste Wax, Beautiflor (a cleaner-wax), and Jubilee, a cream polish, for use mainly in kitchens.

Simoniz Co. puts out Simoniz Paste Wax and Hi-Lite, a liquid silicone, which comes in two shades, one for light wood, one for dark.

American-Marietta's O'Cedar Division has just entered into the aerosol field with a spray version of its liquid Dri-Glo, an all-purpose wax, which is sprayed on and wipes to a hard shine. Other O'Cedar products are liquid Dri-Glo, a silicone polish, the biggest seller at the moment; All-Purpose Polish, an oil-based wax, which can be used on floors as well; No-Rubbing Cream Polish, recommended for chrome but also usable on furniture; and Touch Up, a scratch remover, which also polishes.

Some other major polish producers are Boyle-Midway (New York), which puts out a line of pastes, lemon and red oils, and liquids under the tradename Old English; Beacon (Boston) makes Thrill, a liquid silicone; and Butcher (Malden, Mass.) has liquid Beau. Beacon says it is de-emphasizing Beau, is pushing instead its Flo-Paste, a combination furniture and floor wax containing a 25% solid wax base and no silicones. Butcher, incidentally, has no plans to make an aerosol, contends that regular waxes appeal to owners of better-quality furniture. Butcher believes the high water content of aerosols is damaging to this type of furniture.

Formulations: Here are examples of the formulas of the most popular polishes on the market today. The liquid-solvent type (e.g., Pride) is applied and allowed to dry to a haze, then wiped off, to give a high gloss and a water-repellent surface. Typical formulations contain 3% wax, 3% silicone oil, in naphthol spirits.

Emulsion-type polishes, such as Pledge, have something like the following ingredients: 3% silicones, 3% waxes, 5% emulsifiers, 24% mineral spirits, 65% water.

The foam aerosol polish shown by Carbide has this formulation: 3% silicones; 2% microcrystalline wax, 2% triethanolamine lauryl sulfonate, 2% oleic acid, 1% triethanolamine, 20% mineral spirits, 1% Carbopol solution, 59% water, 1% nonionic alkylanolamide, plus a propellent.

Foam Threat: Some observers in the field feel that foam aerosols eventually could threaten the popularity of the mist aerosols now on the market. Foams are easier to apply, and will not run off vertical surfaces.

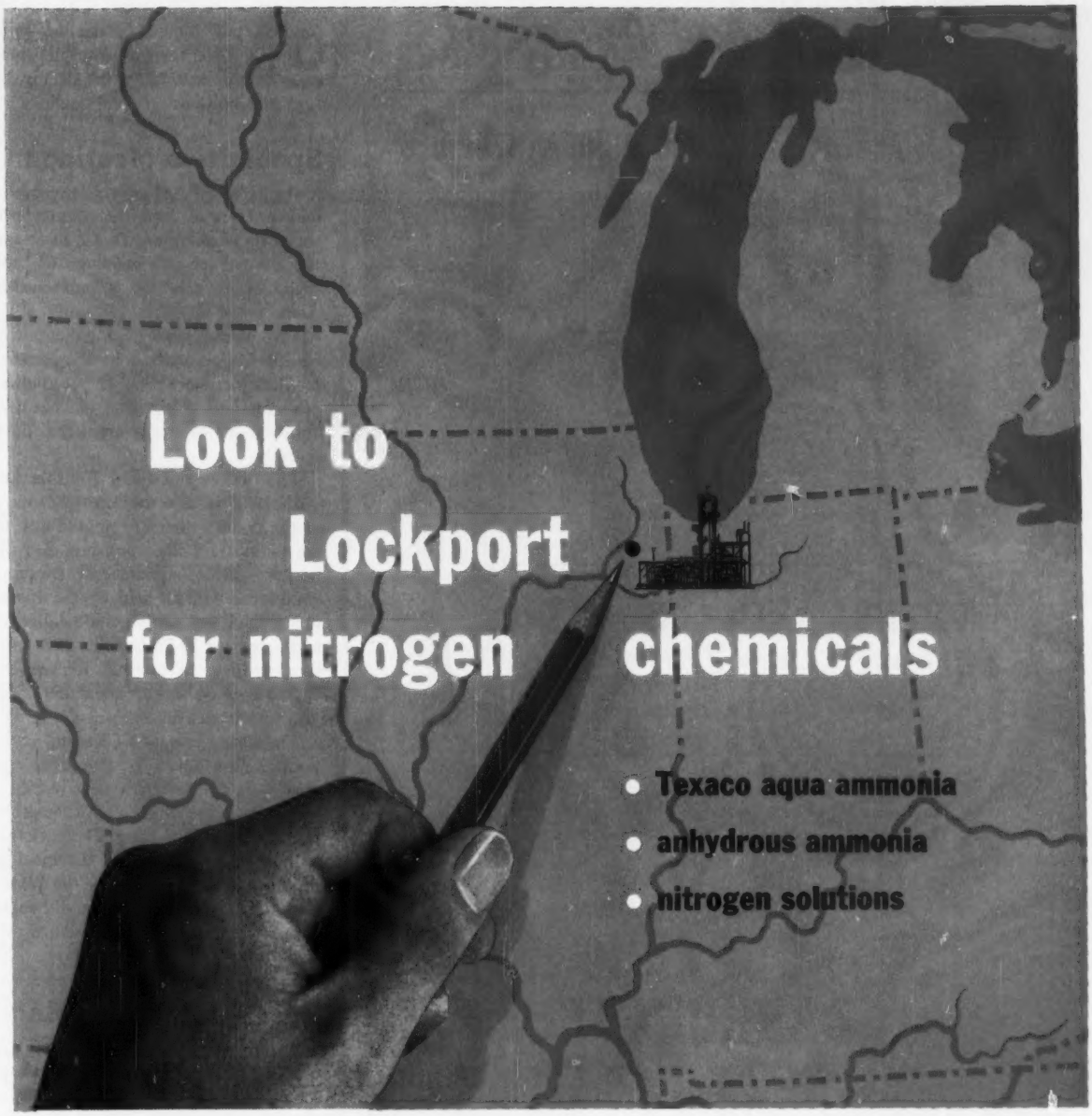
Furniture polish in the form of a foam aerosol is not entirely new. Sears, Roebuck & Co. (Chicago) offered such a product to its customers several years ago, has since withdrawn it. The John C. Stalfort Co. (Baltimore), a private labeler in the polish field, has been offering a foam-type product.

Polymer's Role Doubtful: Although polymer-emulsion-type polishes are widespread in the floor polish field, they are not practical for furniture polishes. The hardness, durability and gloss that polyethylene, for example, would give are admittedly desirable factors. But there are some problems. An ordinary furniture polish is dissolved in succeeding coats, but a polymer-based polish builds up from coat to coat. The housewife would have to wash her furniture, as she does her floor, before applying a new coat of polymer polish. Furniture finishes will not withstand this kind of treatment.

In the Works: Many companies in this country and abroad, particularly Germany, are currently researching a self-polishing, no-rub product. A wax of this kind would be sprayed or wiped on, would produce a shine speedily, without any wiping or rubbing. Progress to date has been limited. The polish does not level well, loses gloss when buffed, and tends to besmear. And unless the polish contains a solvent, all oil, dust and previous waxes must be removed before application.

The Future: To many trade observers, furniture polish—along with polishes for autos, shoes, silver and floors—is not destined for a booming future. Makers of these products are trying to eliminate the polishing entirely, and the strides in this direction have been remarkable in some areas. Certainly, the need for polishes won't disappear tomorrow; the few housewives can—or will—change to products simply because they don't need polish.

Nevertheless, it seems that polish



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markets will inevitably decline—and it's obvious that aerosols, despite their ease of application, won't stem the furniture polishes' gradual decline.

Specialties Meetings

On Dec. 7, chemical specialties makers from all over the country will travel to Washington, D. C., to attend the 46th annual meeting of the Chemical Specialties Manufacturing Assn.

Two of the meeting's highlights will be a thorough analysis by the Aerosol Division on marketing of pushbutton products and celebration of the 30th anniversary of water-emulsion floor polishes.

The Waxes and Floor Finishes Division will take a look at the future of the flooring industry, in addition to the outlook for floor polishes. A symposium on nonagricultural spraying equipment will be held by the Insecticide Division, will include talks on sprayers used in households and dairies, industry, parks, etc. Recent developments in insect attractants will also be discussed.

The Detergents and Cleaning Compounds Division will present at least two papers—one on a new bacteriostat, and another on protein detergents.

Award-winning aerosol packages will be displayed during the meeting at the Mayflower Hotel and the Waxes and Floor Finishes Division will sponsor an exhibit of floor coverings and floor polishes.

Syndet Sales Soaring

The first nine months of '59 saw the establishment of a new three-quarter high—in both pounds and dollars—for U. S. synthetic detergent sales. Soaps sales, meanwhile, continued to decline in both value and poundage. That's the finding of the latest sales census by the Assn. of American Soap and Glycerine Producers.

Sales of soap and synthetic detergents totaled 3,236,700,000 lbs., valued at $830,222,000, up 4.7% and 5.5%, from the first nine months of '58.

Synthetic detergents sales amounted to 2,423,099,000 lbs., with a value of $586,071,000, an increase over the first nine months of '58 of 7.6% in pounds and 5.6% in dollars. Solid synthetic detergent sales totaled 2,000,-699,000 lbs. and $433,755,000, a

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SPECIALTIES

4.1% rise in quantity and 0.4% in dollars. Sales of liquid synthetic detergents—a booming item—climbed to 422,400,000 lbs., a 28.2% gain, and $152,316,000, a 23.9% rise. Synthetic detergents, continuing to edge soaps out of the market, now constitute 74.9% of total reported sales in pounds, and 70.6% in dollars.

Soap sales were 813,601,000 lbs., down 3.2% from the same period last year. Dollarwise, sales amounted to $244,151,000, an increase of 5.2% over the first nine months of '58.

Scouring cleaners sales — not included in totals above — were 292,834,000 lbs., valued at $40,831,000. This is the first year that category has been included in the survey.

•

Cement Resin: Shanco Plastics & Chemicals Inc. (Tonawanda, N. Y.) is offering a resin for all-purpose cements. It's called Shanco 700, is said to give good adhesion to a variety of surfaces and be compatible with all commonly used elastomer bases.

•

Antibacterial Spray: A bacteria-fighting spray for garments, rugs, drapes, other household items has been developed by Ions Exchange & Chemical Corp. (New York). It's called Eversan SP, and will be marketed in the U.S. by Yardney Chemix Corp. (40-50 Leonard St., New York) beginning next spring. The spray is said to impart antibacterial protection for the life of garments, and to be effective on hard surfaces such as linoleum, walls and wodwork. A 10-oz. aerosol of the product is expected to retail for about $1.75.

PRODUCTS

Silicone Varnish: General Electric Co.'s Silicone Products Dept. (Waterford, N.Y.) has a new silicone varnish, SR-220, which GE says can be cured in the same temperature range as that for curing conventional organic coatngs, and which is claimed to have good electrical properties at 150 C.

•

Aluminum Etchant: Pennsalt Chemicals Corp. (Philadelphia) is marketing an aluminum etchant in solid form under the designation AE-16 S. The product is said to be dustless, easy to handle, low in cost and to give off no heat of solution. (The compound is an improved version of Pennsalt's flake-form etchant.)

Anticorrosion Coating: Shell Chemical Corp. (Los Angeles) has come up with Epon Resin-Bitumen coating, said to be especially suited for use as a corrosion-resistant coating for pipe and other metal equipment, and on concrete surfaces. It's also claimed to have greater chemical resistance than existing epoxy-coal tar enamels.

•

Epoxy Stripper: Enthone, Inc. (New Haven, Conn.), has introduced Stripper S-28, the second in a series of chlorinated, water-dilutable strippers for epoxy enamels. It's said to strip synthetic enamels rapidly at room temperature and at dilutions as high as one part stripper to 20 parts water.

•

Emulsifier Twins: Stepan Chemical Co. (Chicago) reports its new Toximul R and Toximul S emulsify all types of pesticides, such as weed killers and chlorinated and phosphate insecticides. Stepan claims the products will simplify inventories and formulations for toxic systems formulators.

•

Phosphatizing Process: A "dry" phosphatizing process, said to eliminate water solutions and to apply protective coatings to metal parts, was shown by Du Pont Electrochemicals Dept. (Wilmington, Del.) at the recent National Metal Exposition and Congress in Chicago. The process links vapor degreasing to spray-in-vapor painting in a metal-finishing system based on trichlorethylene.

•

Adhesive Family: The B. B. Chemical Co. (Cambridge, Mass.) is marketing three adhesives with high solids content and low shrinkage for bonding or sealing irregular surfaces and porous materials. They're called Bostik 2292, 2293 and 2297, are said to adhere to a variety of materials, resist both fresh and salt water, and can be painted when dry.

•

Alkyd Resin System: In a recent technical bulletin, Hooker Chemical Corp. (Niagara Falls, N.Y.) describes an alkyd resin system using trichlorofluoromethane as a foaming agent. The fluorinated compound permits preparation of rigid fire-resistant polyurethane foams with low K factor. The foams are said to be particularly suitable for cores in sandwich-type construction, pipe covering and other insulation applications.

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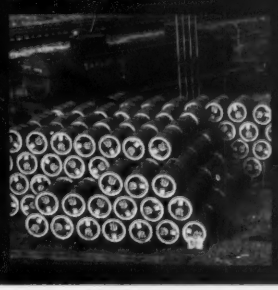

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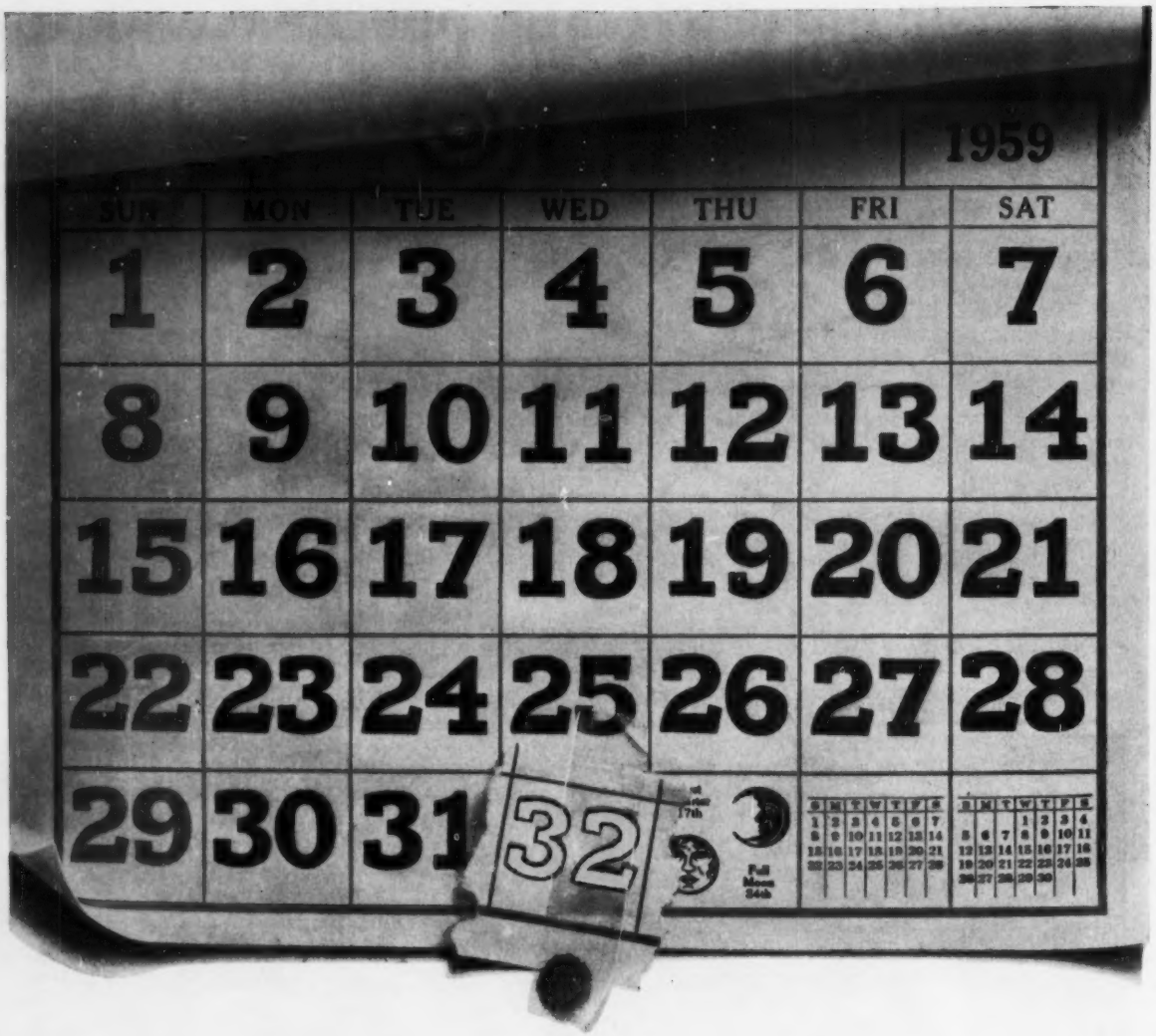

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CW PHOTOS—MARSHALL

Palmer, Plax's John Carlile and Contini check cold-folded polystyrene tray made by new machine.

Unveiling the Newest Plastic Package

This week at the Packaging Machinery Manufacturing Institute Exposition in New York two new packaging machines are making their debut. Significance: they cold-fold oriented polystyrene sheets into semirigid trays (above) without using heat, adhesives or scoring. Behind this news is the story of Monsanto Chemical Co.'s broadly coordinated research and sales effort to establish its styrene as a factor in plastic packaging.

The two machines—Plasti-Lok and Multi-Fold press—are the result of more than three years of cooperative effort by Monsanto, machine designers Charles Palmer & Associates, and machine builder R. A. Jones & Co. Purpose: to find a way to sell more Polyflex, the biaxially oriented polystyrene sheeting made by Plax Corp.

The two machines perform somewhat similar functions. The Plasti-Lok cold-folds and locks unscored, die-cut Polyflex blanks into trays at speeds from 40 to 100 trays/minute, depending on dimensions of the package. This, according to Monsanto's Lou Contini, manager of market development for the firm's plastics division, and a key member of the program, is comparable to the speeds and efficiencies of present paperboard tray-forming machines.

The companion Multi-Fold press was designed, said Palmer, to make a number of folds in one operation, reducing plastic packaging labor and setup costs to ranges competitive with those of paper setup box fabricating methods. Both machines incorporate Palmer's patentable cold-fold process, but the Multi-Fold does not lock the corners of the trays, which are shipped nested to the user.

Push for Polyflex: Monsanto be-

Palmer demonstrates Multi-Fold press.

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came interested in the program when it acquired 50% interest in Plax. Despite certain outstanding qualities, Plax's Polyflex—"stretched" to orient the molecules and strengthen the film — had not gained acceptance in the packaging field. It had been found that the relatively slow and expensive methods traditionally used to heat and form plastic sheets kept the material from wide use.

Monsanto contacted the Palmer firm (Somers, Conn.), presented the unsuccessful material and requirements for its volume use in the packaging field. Main problem facing Palmer: how to cold-fold a bioriented polystyrene sheet 7½ to 10 mils thick.

Palmer's solution (on which there is a patent pending) took two years, involved completely confining the material while it was being folded. The result, according to Monsanto, was "an inexpensive, clear, semirigid sheet folded into a container with bends that showed no cracking or crazing, and with side and end walls that retained their position."

Next, Palmer had to find a means of gluing, heat sealing or locking the corners of the package.

The firm hitchhiked on experience gained in developing its Tray-Lock carton, devised a patentable lock that took advantage of Polyflex qualities. In the locking process, the tray is temporarily distorted, male-to-female locks are engaged, and the ends, springing back to shape, remain locked unless the package is badly distorted or damaged.

Monsanto and Palmer joined with R. A. Jones Co. (Covington, Ky.), which was to design, build and market the machine — now known as Plasti-Lok. Jones was granted "first refusal" of all machinery developments resulting from the application of the basic Palmer cold-fold principle (on which Monsanto bears the preliminary development costs).

Personalized Selling: To promote the Plasti-Lok and Multi-Fold machines, the three firms developed a program of "personalized market development." Representatives have been assigned to end-users (food packers, etc.), have been instructed to "stick with the prospect until the machines are used, or we know the reasons why."

Plax is backing the efforts of the representatives, providing required technical service and creative design efforts.

To sell the concept of plastic packaging, three-man teams composed of representatives of Monsanto, Palmer and Jones are visiting box manufacturers, showing visual aids and giving sales pitches on the advantages of Plasti-Lok and Multi-Fold.

So far, they have concentrated merchandizing and market development promotion on three types of food packers — those handling dried fruits, produce and wieners.

The process is expected to be used to package virtually any type of merchandise that would sell better in a transparent box.

Keen Competition: Despite the obvious advantages of Plasti-Lok and Multi-Fold, Monsanto and company can expect sharp competition in many packaging areas.

For example, Dow's polystyrene Trycite (not oriented) is currently being evaluated for possible use in the 3 to 10-mils range for press-formed containers and lids, fabricated containers and signs. Trycite was introduced in '58 as the first low-cost (60¢/lb. at high yields of 25,400 sq.in./lb./mil), thin-gauge polystyrene film. (Plax currently is revising its polyflex pricing schedule, expects the price to be cheaper than Trycite and cellulose acetate—its major competitor—which sells for over $1/lb. in 1,000 sq.-in. sheets of 10-mils thickness.)

A major plus for Plasti-Lok: it can be inserted in the existing packaging line, requires no new technical knowledge on the part of the operators. Even this factor, however, has been challenged by a new process called All-Pac. The process — designed in Germany, controlled under international patents by a Swiss packaging development group, and marketed in North America by Leedpak (New York) — provides fully integrated forming, filling and sealing of plastic bottles from a variety of plastics.

Poly Rivals: Also promising in the packaging field is AviSun Corp.'s Olefane, a strong, high-clarity polypropylene, which is expected to be competitive in most packaging applications with cellophane, polyethylene and possibly polystyrene. Still in the developmental stage, Olefane will be available in flexible film of 1 to 4 mils and in thermoformed sheets

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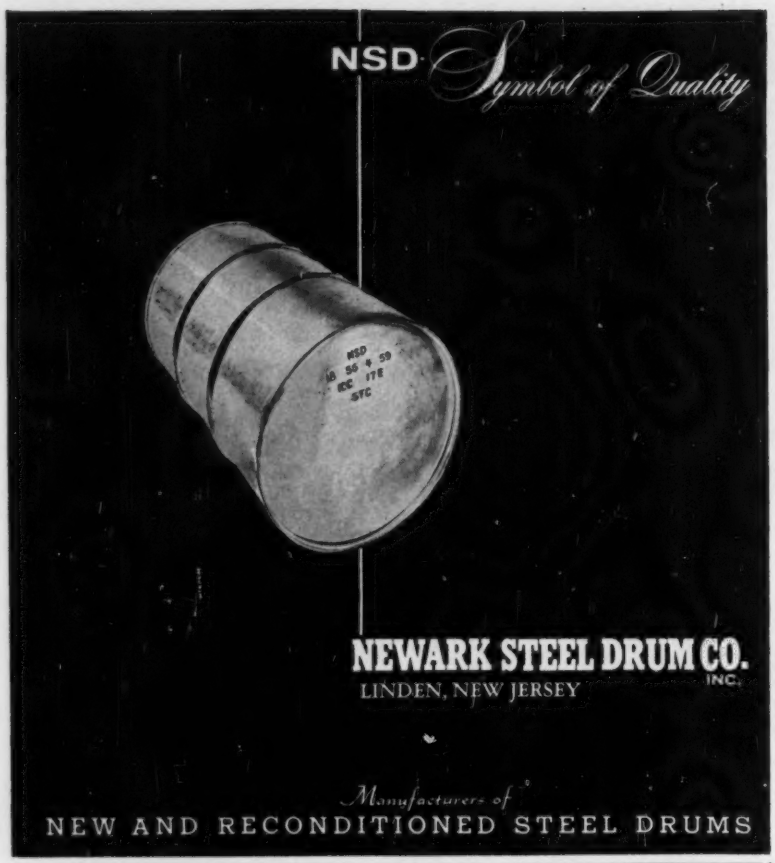

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of 4 to 20 mils. Unoriented, it withstands high temperatures and solvents better than does polystyrene, is tougher and less stiff, but it loses transparency after 6-mil thickness is reached. Olefane boasts the greatest area of coverage (per pound) of any plastic film.

AviSun reports that it is currently working on an oriented polypropylene, which will be even stronger than the unoriented.

Both Koppers, with its expandable polystyrene Dylite, and Union Carbide, with polyethylene film and extrusion coating, look to figure prominently in the plastic packaging field.

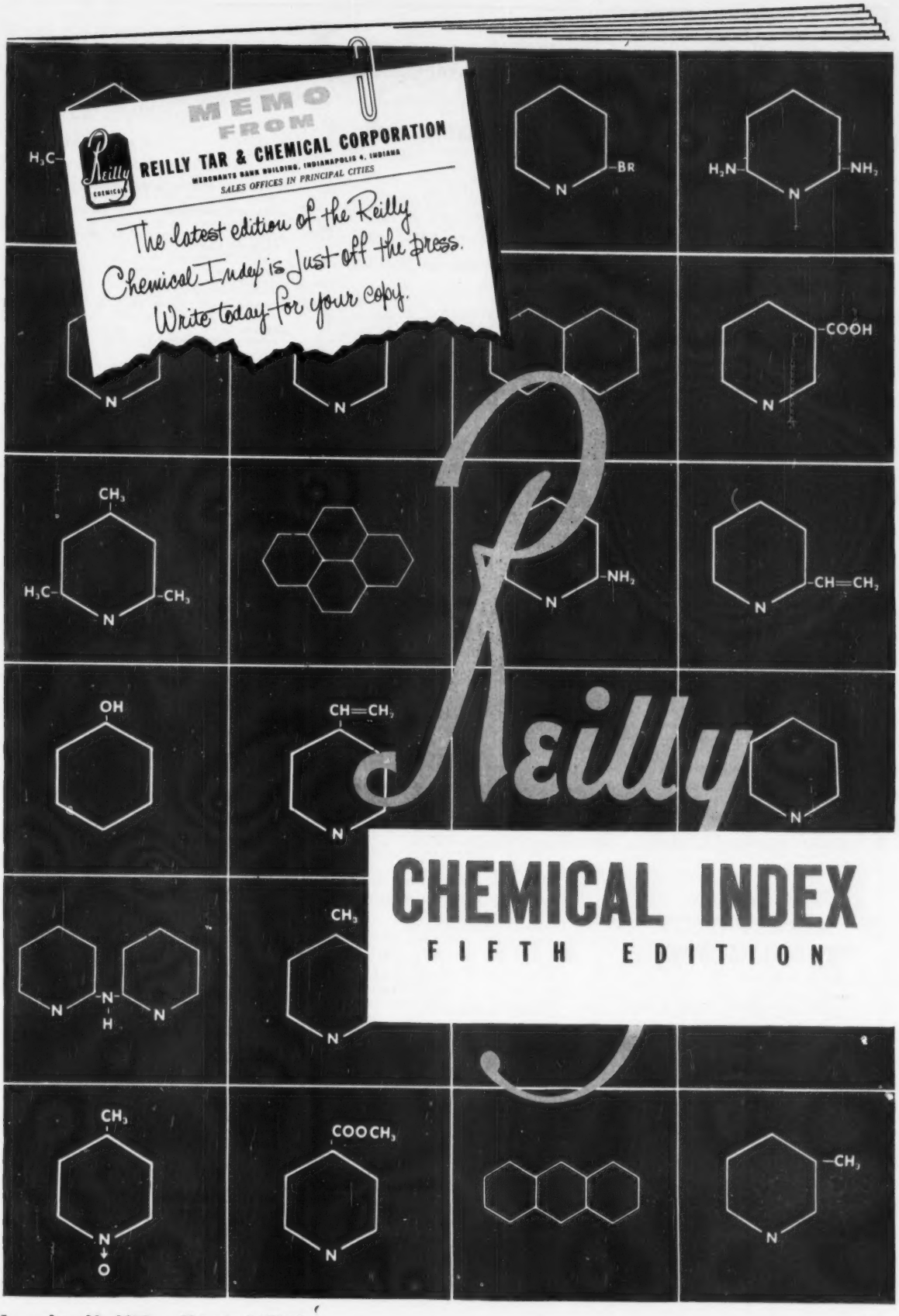
Carbide's latest achievement in plastic packaging is its tear-tape applicator, developed to put a tape opener on the outside of polyethylene packages. Carbide also has developed apparatus for constructing boxes of polyethylene-coated board, perfected a sealing system for high-speed automatic overwrapping machines using polyethylene film, and produced a new adhesive to seal polyethylene packages.

Unquestionably, plastic packaging is registering sharp growth. Both as a partner and a customer, CPI concerns will be taking part in the development of cheaper, faster, more integrated, more flexible plastic packaging systems, as well as lighter, cheaper, more durable containers of all types. In this connection, Monsanto's experience provides a twofold lesson: (1) how careful market analysis and close product study can result in changes that lead to market penetration; (2) how close cooperation between material supplier and package maker results in packaging progress.

DATA DIGEST

• **Urea:** Fact sheet summarizes properties and availability of prilled and crystalline urea. Chemicals Division, Olin Mathieson Chemical Corp. (New York).

• **Organic Chemicals:** Catalog lists 4,000 organic research chemicals alphabetically, by empirical formulas, and by classes, including acetals and ketals, aldehydes, amines, carbamates, carboxylic acids, anhydrides and their salts, hydrocarbons, indoles, peptides, phenols, purines, and sulfur compounds. Aldrich Chemical Co. (2369 North 29th St., Milwaukee 10).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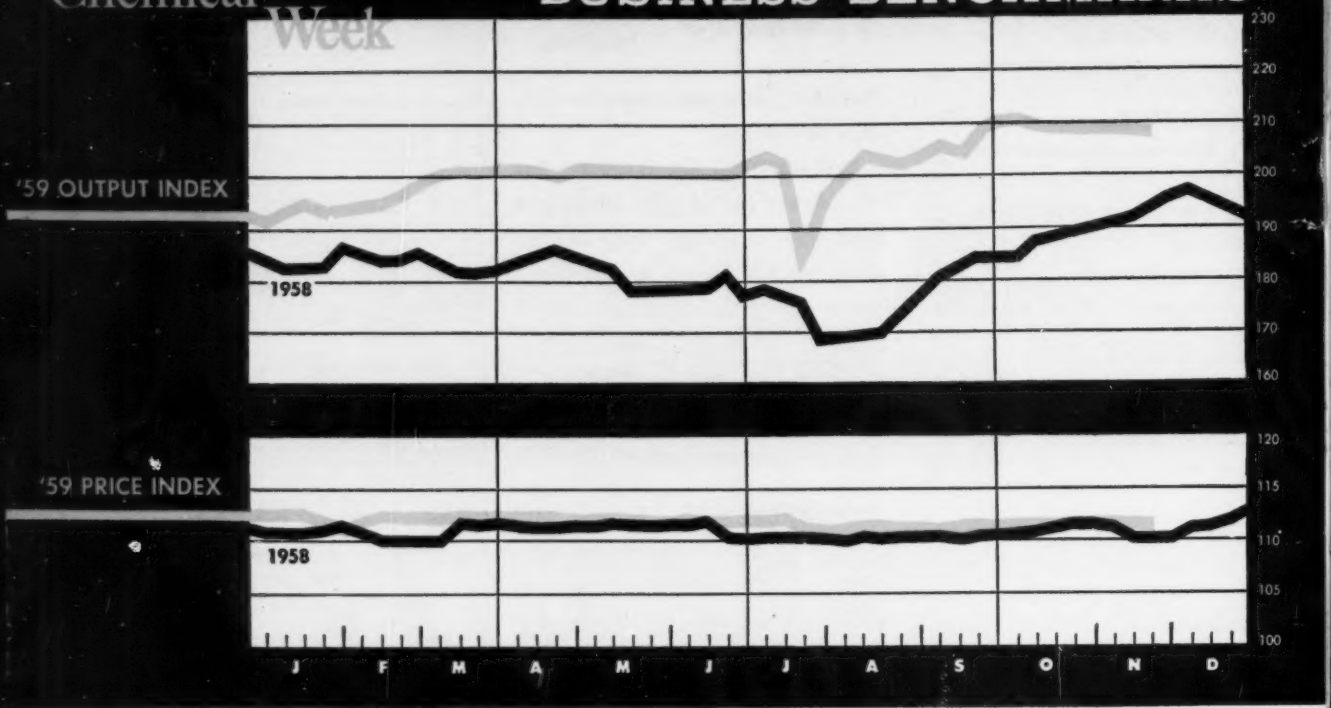

NOVEMBER 21, 1959

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	208.6	208.8	194.5
Chemical Week wholesale price index (1947=100)	110.9	111.5	111.4
Stock price index (12 firms, Standard & Poor's)	58.98	58.39	47.97
Steel ingot output (thousand tons)	1,300	368	2,011
Electric power (million kilowatt-hours)	13,019	12,978	12,311
Crude oil and condensate (daily av., thousand bbls.)	6,899	6,887	7,003

EMPLOYMENT INDICATORS (thousands)	*Latest Month*	*Preceding Month*	*Year Ago*
All manufacturing	16,093	16,093	15,464
Nondurable goods	6,900	6,929	6,718
Chemicals and allied products	854	860	818
Paper and allied products	562	563	547
Rubber products	268	267	245
Petroleum and coal products	229	228	237

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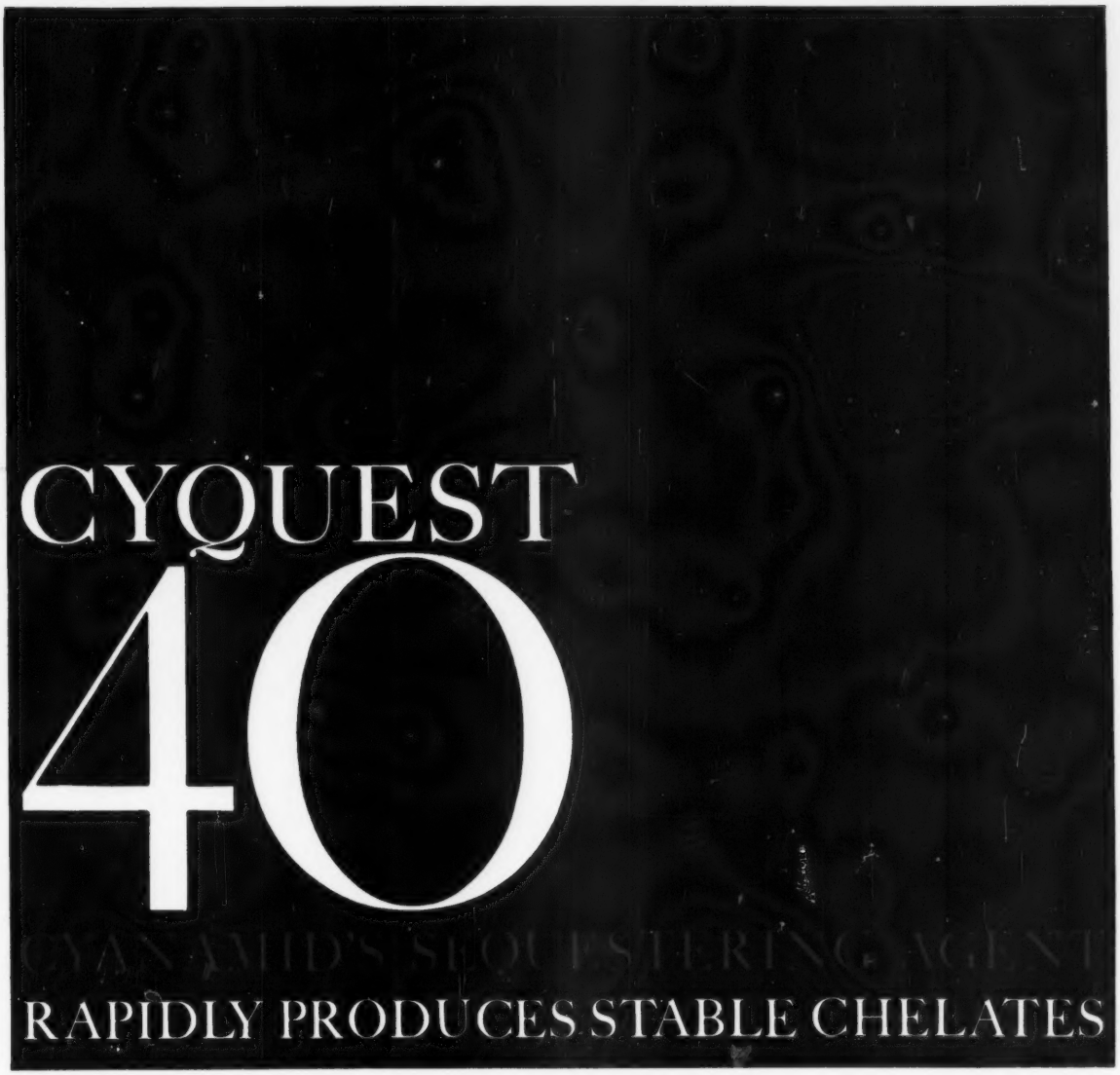

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